MODERN Machine Shop

OCTOBER, 1952

BROACHES and BROACHING FIXTURES

Complete Broach Service

ENGINEERING

Our estimating and design engineers will analyze your broaching jobs, present or proposed, and give you actual cost and production data on new tooling . . . you know your savings beforehand.

MANUFACTURING

Every size and type of broach is manufactured in our modern plant. Highest standards of quality are assured through specialized equipment and processes from roughing operations through final inspection.

SERVICE

Detroit Broach field engineers are prompt to give you help when needed on broaching jobs in your plant. We also will setup and tryout your new broach tooling . . . thus assuring most efficient production.

that's all we make!

Detroit Broach Company has always designed and built broach tooling exclusively . . . for every type, size and make of broaching machine.

This specialization thoroughly qualifies our engineers to give sound, unbiased recommendations on broaching procedures and tooling . . . it also means more efficient manufacture of broach tooling since our modern plant is equipped and manned specifically for that single purpose. These two factors are extremely important to you because they provide assurance that your broaching problems are in the hands of highly experienced specialists . . . and such specialization *is* necessary to obtain greatest all-round efficiency and economy from broaching applications.

DETROIT *Broach* COMPANY

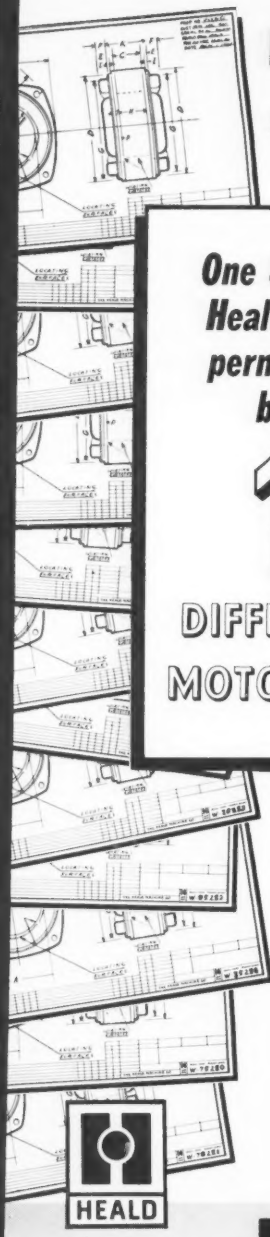
20201 SHERWOOD AVE. • DETROIT 34, MICHIGAN

WORLD'S LARGEST MANUFACTURER OF



BROACHES AND BROACH TOOLING EXCLUSIVELY

Here's How Heald versatility solved twelve borizing problems at once



One Single-station Heald Bore-Matic permits precision borizing of

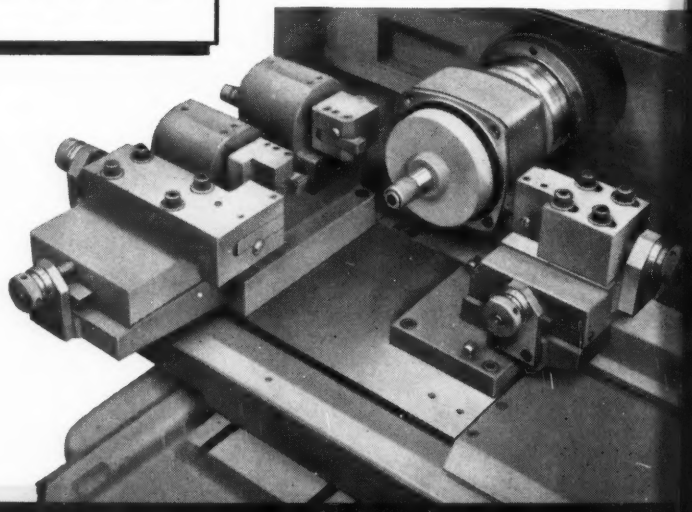
12

DIFFERENT SIZE MOTOR STATORS

• Where high production is required on a variety of different size parts, the extra versatility of a Heald Bore-Matic pays big dividends in time and effort saved.

Take the Model 321 machine shown below, for example. This boringhead and tool block set-up accommodates 12 different sizes of motor stators, for chamfering, turning and facing rabbet diameters. Interchangeable workholding adapters, adjustable tooling and flexible drive arrangement permit this unusual economy of equipment for such a diversified application. Work is located on stake fixtures from the I.D. of the laminations and against the adjacent face. A chip shield prevents metal particles from getting into the windings.

Remember—when it comes to precision finishing, it pays to come to Heald.



HEALD

Heald precision speeds the nation's production

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

VOLUME 25 NUMBER 5
OCTOBER, 1952

MODERN Machine Shop

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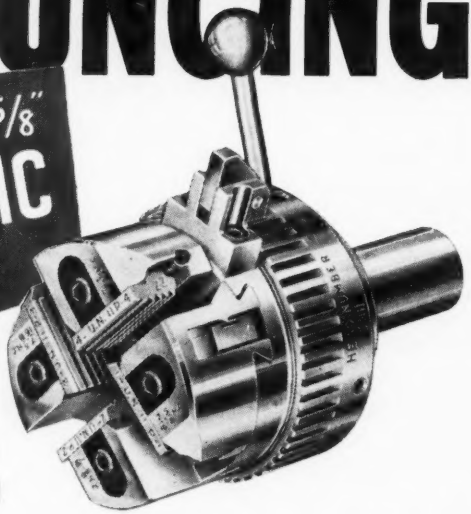
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ANNOUNCING

The IMPROVED 5/8" LANDMATIC HEAD - - -



- **Positive Locking Action**
- **More Rigid Construction**

An improved **LANDMATIC** Hardened and Ground threading head has been designed for use on turret lathes, hand-operated screw machines, and automatic screw machines employing a stationary head. The 5HH **LANDMATIC** is a stationary self-opening head, and will produce threads ranging from 1/4" to 5/8" in diameter. Its construction features two important improvements in design—a positive locking action, and greater head strength.

The positive locking action is provided by a new size-adjustment mechanism. A pivoted latch is held in engagement with notches on the adjustment ring by spring tension. A movement of one notch makes a corresponding adjustment of .001" on the pitch diameter of the workpiece.

The greater overall strength of this die head results from the increased thickness of the head body and its various parts. The new design allows this small die head to easily withstand the extreme stresses imposed when threading special alloy steels.

The 5HH **LANDMATIC** Head has a notably small number of working parts. All parts are made of special alloy steel, and are hardened and precision ground. Left-hand threads may be cut by using left-hand chaser holders and regrinding the same set of chasers. More information available on request.

LANDIS *Machine* CO. WAYNESBORO PENNA., U.S.A.

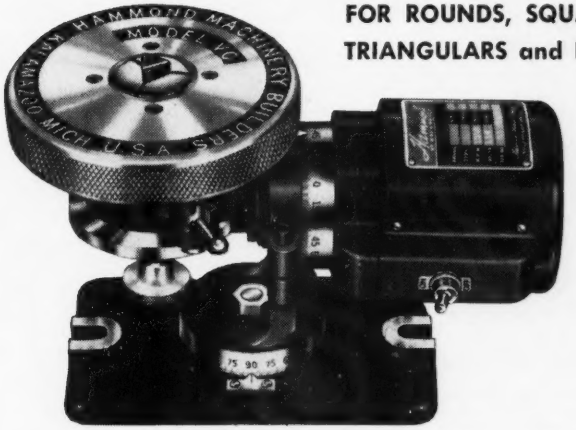
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Hammond OF KALAMAZOO

GOOD MACHINERY SINCE '82

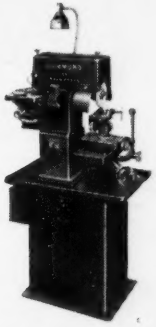
FAST ACCURATE GRINDING of SOLID CARBIDE INSERT TOOLS

FOR ROUNDS, SQUARES, TRIANGULARS and RECTANGULARS



MODEL VC, Style M Motorized Solid Carbide Insert Grinding Fixture. Style H, without motor also available. Write for Bulletin No. 701.

THE Hammond Solid Carbide Insert Grinding Fixture pays for itself in a few weeks. Offers a fast, economical and accurate means of grinding chip breaker grooves in round, square, triangular and rectangular shapes and for rough and finish grinding of dull and damaged carbide inserts. Motorized Style M with lug base can be mounted on most tool and surface grinders and Hammond CB-76, CB-77 and CB-77W Chip Breaker Grinders.



HAMMOND MODEL CB-77 CHIP BREAKER AND DIAMOND FINISHING GRINDER can be supplied with both the standard Any Angle Vise and the Model VC Solid Carbide Insert Grinding Fixture.

BUILDERS OF AMERICA'S MOST COMPLETE LINE OF CARBIDE TOOL GRINDERS

Hammond Machinery Builders INC

1615 DOUGLAS AVENUE • KALAMAZOO 54, MICHIGAN

"See us at Booth 1130 — National Metal Exposition

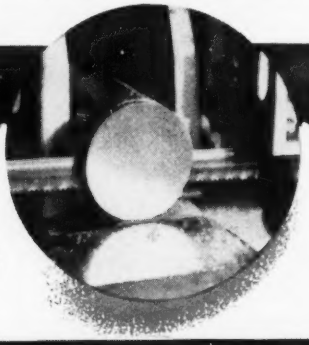
Get a Longer Run for your Money... with

SIMONDS METAL-CUTTING BAND SAWS



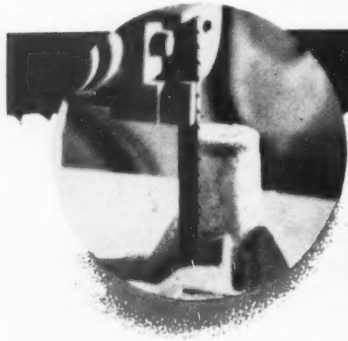
. . . for Contour Cutting

Made of tough, alloy steel that resists breaking, yet holds a keen cutting edge, Simonds Standard-Tooth Hard-Edge Band Saws in the narrower widths are outstanding favorites for contour work. That's why you'll find them so widely used in die-making and contour sawing of all kinds. Perfectly formed teeth, set with absolute evenness on both sides of the blade, insure smooth, accurate results and greater satisfaction



. . . for Horizontal Cutting

In the wider widths, these rugged, long-lasting Hard-Edge Blades are "tops" for use on horizontal machines, cutting off bars, tubing, angle iron, etc. Furnished either Regular Set or Wavy Set to handle the variety of cutting encountered in steel warehouses and general shop work. Hardy new 100' and approximately 300' coil containers insure factory perfect saw blades. Welded-to-length saws also supplied.



. . . for Non-Ferrous Cutting

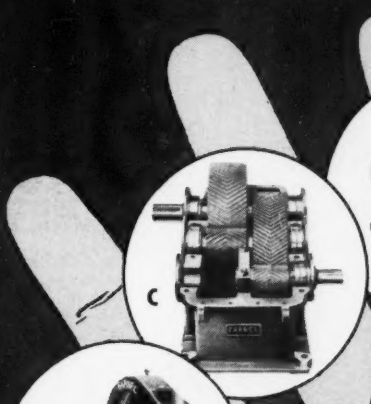
Simonds Hard-Edge Skip-Tooth Band Saws are especially adapted for use on soft materials such as aluminum, magnesium, plastics, and hardwoods ...provide extra gullet capacity with maximum blade strength...are widely used in brass and aluminum foundries and plastic fabricating plants. Your Simonds Distributor will supply you with the right blade for your job.

SIMONDS SAW AND STEEL CO.

FITCHBURG, MASS.

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que.
Southern Service Shop in Meridian, Miss. (formerly J. H. Miner Saw Mfg. Co.).
Simonds Divisions: Simonds Steel Mill, Lockport, N. Y., Simonds Abrasive Co., Phila., Pa. and Arvida, Que., Canada

FIVE ANSWERS
TO SPEED REDUCER PROBLEMS



Farrel Speed Reducers are made in a number of different designs, five of which are illustrated here.

All units are supplied with precision gears, generated by the famous Farrel-Sykes process for smooth, quiet, efficient power transmission; shafts and bearings factored to safeguard against interruption of vital processes; gear cases proportioned to withstand repeated heavy peak loads; joints sealed to prevent entrance of dirt.

Send for further details of these designs. Ask for a copy of Bulletin 449—no cost or obligation.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo, N.Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Detroit, Chicago, Portland (Oregon), Los Angeles, Salt Lake City, Tulsa, Houston, New Orleans.

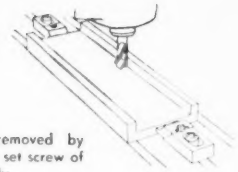
A Standard Single Reduction Unit
B Unit with pinion on extended shaft supported by outboard bearing
C Standard Double Reduction Unit
D Heavy Duty Single Reduction Unit
E Horizontal Right Angle Unit

FB-746

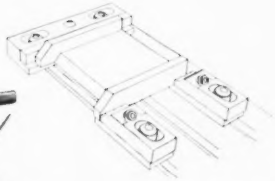
Eliminate U-Clamps, Straps and Fingers

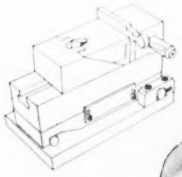
J & S *All-Purpose* JAW CLAMPS

secure work-pieces quickly and rigidly easily adapted to box fixtures

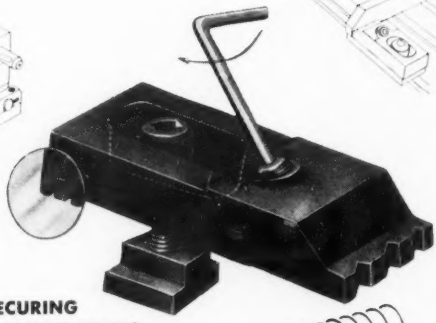


Work-piece removed by loosening one set screw of one clamp only.





Precision Grinding Vise with or without sine bar allows rapid unloading and exact relocating.

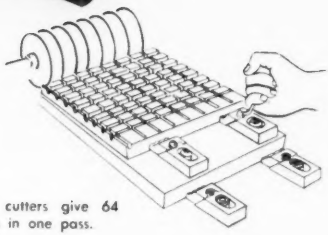


J & S Double Half Vise, for use on jig borers, millers, planers and shapers.

NEW METHOD OF SECURING WORK-PIECES TO MACHINE TOOLS

for Lathes, Planers, Milling Machines, Boring Millers, Jig Borers, etc. (9 different types including new Counter Clamp)

1. **Faster Set-up:** *One adjusting screw* provides a 5-ton force to *position* and *hold* the work-piece.
2. **Stronger Grip:** The *inward* and *downward* movement of the jaw clamp at a 45° angle gives a *single, powerful clamping action* — easily applied and controlled.
3. **Less Obstruction:** You can pass over the whole clamp 1" from the working surface of the machine face. *No interference with reading or measuring tools.*



Eight cutters give 64 pieces in one pass.

J & S TOOL CO., INC.
475 Main Street, East Orange, N. J.



New home of J & S Tool Co., Inc.

J & S TOOL CO. INC.

DELIVERY FROM STOCK

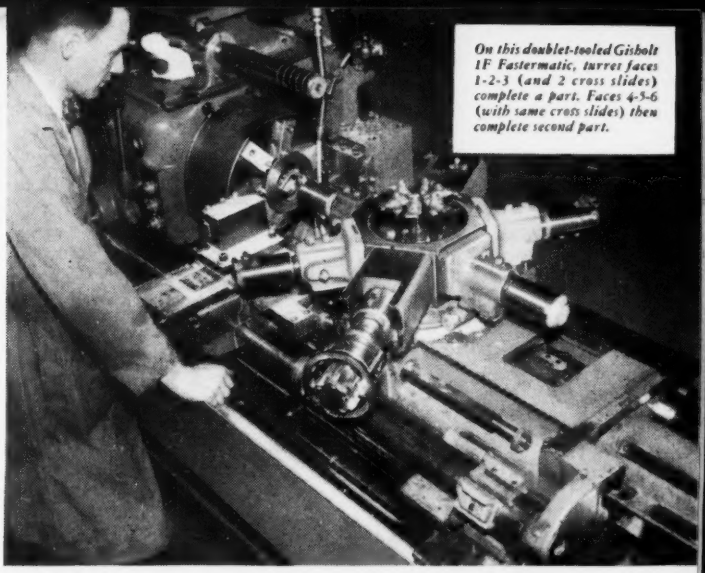
WRITE FOR NEW FOLDER!

—contains complete details on advantages, applications, types and sizes available.

Booklet describing J & S "Fluidmation" Wheel Dressers, etc., also sent on request.

J&S

HOW DUPLICATE TOOLING... AND A FASTERMATIC...



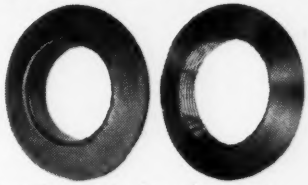
On this doublet-tooled Gisholt 1F Fastermatic, turret faces 1-2-3 (and 2 cross slides) complete a part. Faces 4-5-6 (with same cross slides) then complete second part.

doubled production!

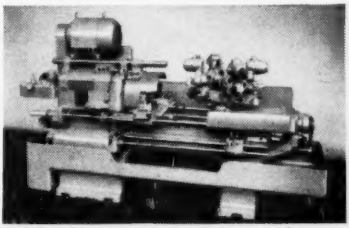
The time *and unit cost* for machining these cast iron pulley flanges were cut in half when the Fastermatic with double tooling took over the job.

Just three turret faces were needed to complete the machining and threading on each part. Therefore, tooling is repeated on the other three turret faces so that *two* parts are finished with each revolution of the turret. Production is doubled over the old method . . . time lag is cut to a minimum . . . there's twice the time between tool changes.

This smart setup illustrates one of the many ways Fastermatic Automatic Turret Lathes give you greater efficiency and lower costs on a broad range of jobs. And one operator can usually handle two or more machines. Ask for the facts.



Floor-to-floor time for these pulley flanges is down to 1.75 minutes. Duplicate tools and collapsing taps on the turret rough and finish the bore, chamfer and cut threads. Front and rear slides shave the angle and form the radius on the O.D.



Gisholt 1F Fastermatic Automatic Turret Lathe

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

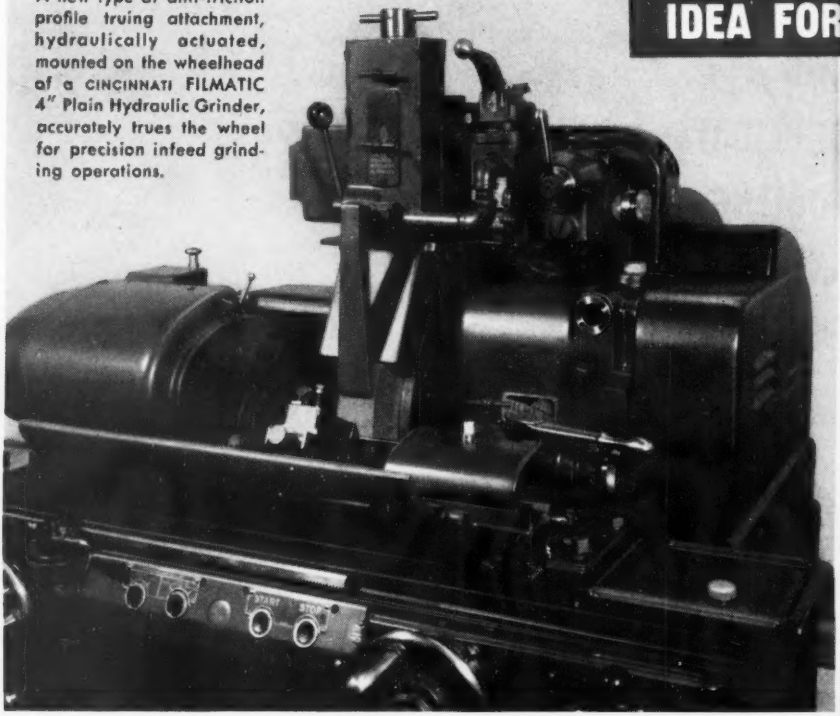


THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

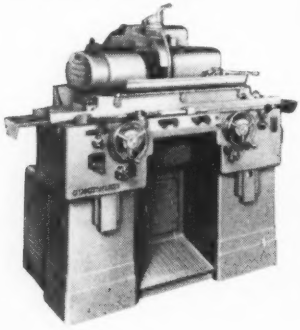
TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

IDEA FOR

A new type of anti-friction profile truing attachment, hydraulically actuated, mounted on the wheelhead of a CINCINNATI FILMATIC 4" Plain Hydraulic Grinder, accurately trues the wheel for precision infeed grinding operations.



Below: CINCINNATI FILMATIC 4" Plain Hydraulic Grinding Machine. Catalog No. G-551-2 contains complete specifications.



Drawing of part ground on the equipment illustrated here. Production data:

Part name	Armature shaft
Material	Steel
Operation	Finish grind two diameters
Stock removal . .	.003"
Production	210 per hour
Equipment	CINCINNATI FILMATIC 4" Plain Hydraulic Grinder, with tooling by Cincinnati Application Engineers

CINCINNATI

FILMATIC

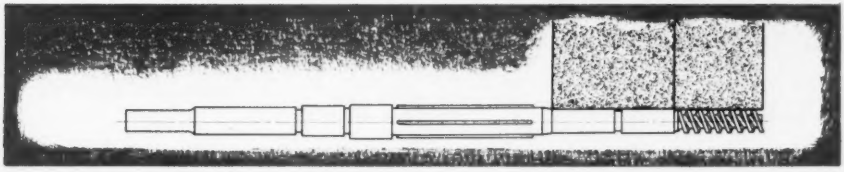
CINCIN

GRINDING POWER FOOD MIXING PART

Offers Possibilities for Defense Application

Ideas employed for the low-cost production of almost any article can usually be carried over to defense work. One that has possibilities for improving many profile precision grinding operations on slender parts is illustrated here . . . a CINCINNATI FILMATIC 4" Plain Hydraulic Grinding Machine, equipped with a new type of hydraulic profile truing attachment over the grinding wheel guard. The attachment accommodates wheel widths up to 3". It follows the cam with a fine degree of sensitivity, because the diamond holder housing is mounted on anti-friction ways. With this unit, the grinding wheel is trued and dressed more accurately than ever before, and this advantage is reflected in closer accuracy of infeed ground work. ¶To help the operator maintain a rapid output, the machine is equipped with an automatic infeed attachment. Production averages about 210 per hour, while easily maintaining the specified accuracy of .0005" on diameter, and straightness of .0001". ¶CINCINNATI FILMATIC 4" Plain Hydraulic Grinders have many features of value for precision centertype grinding operations on small diameter work up to 18" in length. All of them are outlined in catalog No. G-551-2. Of course, these machines are in short supply at this time, but the idea outlined here is presented for the possibility of applying it to your high priority work, or to your bread-and-butter product when the present unusual demand for machine tools eases up.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO



NATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

For Precision Work

NO OTHER GRINDER CAN MATCH



A TAFT-PEIRCE #1 Surface Grinder

Machine illustrated is equipped with vernier attachments for horizontal and vertical settings to .0001".

This Taft-Peirce #1 Surface Grinder produces surfaces with an accuracy, flatness, and finish formerly considered difficult or impossible. Originally designed and built for our own shop, it's the finest yet devised.

Full ball bearing construction minimizes friction...provides extreme precision with almost effortless operation. So smooth that users report finer finishes, less operator fatigue, and sharply reduced wheel wear.

Another exclusive feature—the tilting wheelhead simplifies setups, speeds difficult angle and shoulder work.

Compact, yet heavier and sturdier than other machines, the Taft-Peirce #1 Surface Grinder maintains its accuracy over many years of rugged service. Little or no maintenance is required. For more information write today.

THE TAFT-PEIRCE MANUFACTURING COMPANY
WOONSOCKET, RHODE ISLAND

T-P means TOP PRECISION



For Contract Service; Design and Manufacture of Tools, Dies, Jigs, Fixtures, and Complete Machines.

KNIGHT'S

Power Feed ROTARY TABLES

fast, low-cost ROTARY MILLING & INDEXING on any milling machine!



- **Completely Self-Contained Motor-Driven Units**
- **No Set-Up Time — Just Plug Into Any Electric Outlet**

Can be used on any milling machine without additional or special equipment. Set-up time is completely eliminated.

Use them for Automatic Cycle Milling . . . Cam Milling . . . Face Milling . . . as an Automatic Revolving Fixture . . . and for other special work to save costly time and labor.

20″ Model: 18 quick-feed changes, 1½″ to 52″, or 3″ to 108″.

42″ Model: Infinite variable feed. Automatic positioning. Table can be increased to 72″ with subplates.

Mail Coupon For Brochure

ATTACH TO COMPANY LETTERHEAD

W. B. KNIGHT MACHINERY CO.
3922 W. Pine Blvd., St. Louis 8, Mo.

Send information on Power-Feed Rotary Tables

NAME .....

TITLE .....

☐ Also send details on Knight Milling Machines

KNIGHT VERSATILE MILLERS ACCURATE-RIGID

W. B. KNIGHT MACHINERY CO.
3922 WEST PINE BOULEVARD
ST. LOUIS 8, MISSOURI

Hole Location Practices

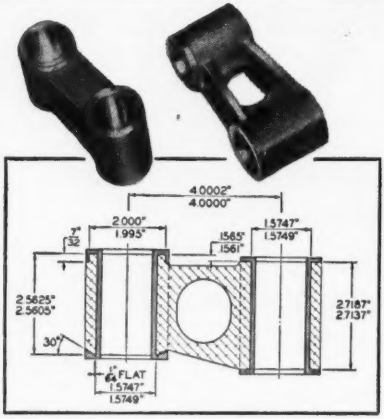
Published in the interests of greater accuracy and quality in the toolroom and on the production line by the Moore Special Tool Company, Inc., 730 Union Avenue, Bridgeport 7, Conn., builders of Jig Borers, Jig Grinders, Panto-Crush Wheel Dressers, Die Flippers, Motorized Centers and a complete line of Hole Location Accessories.

JIG BORING CUTS
Production Time 90%

It took 3½ hours to machine each of these aluminum-alloy supporting arms, used on our Moore Panto-Crush Wheel Dresser, on a boring mill. Now—on our No. 2 Jig Borer—it takes only 22 minutes per piece for lots of 100—a time saving of 90%. Hole diameters and between-centers dimensions are held to 0.0002" to insure extreme accuracy between pivot points in the wheel dresser and allow the installation of precision bearings in the holes. Read the job details at the right.

Moore Jig Borers are being used more and more on short-run production of precision work—boring, drilling, reaming and inspecting precisely located and machined holes in production parts, as well as in dies, jigs and other tools.

Write today for our new 24-page catalog, containing other examples of time- and cost-cutting Jig Borer operations.

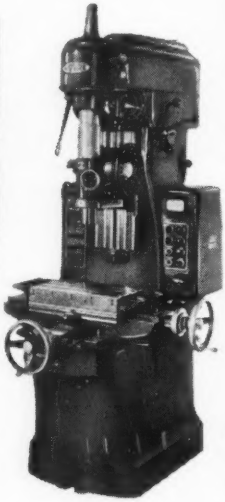


Two holes, three flat and one beveled face and shoulder on one boss (the areas crosshatched in drawing) are all machined on the Jig Borer—in only 22 minutes.

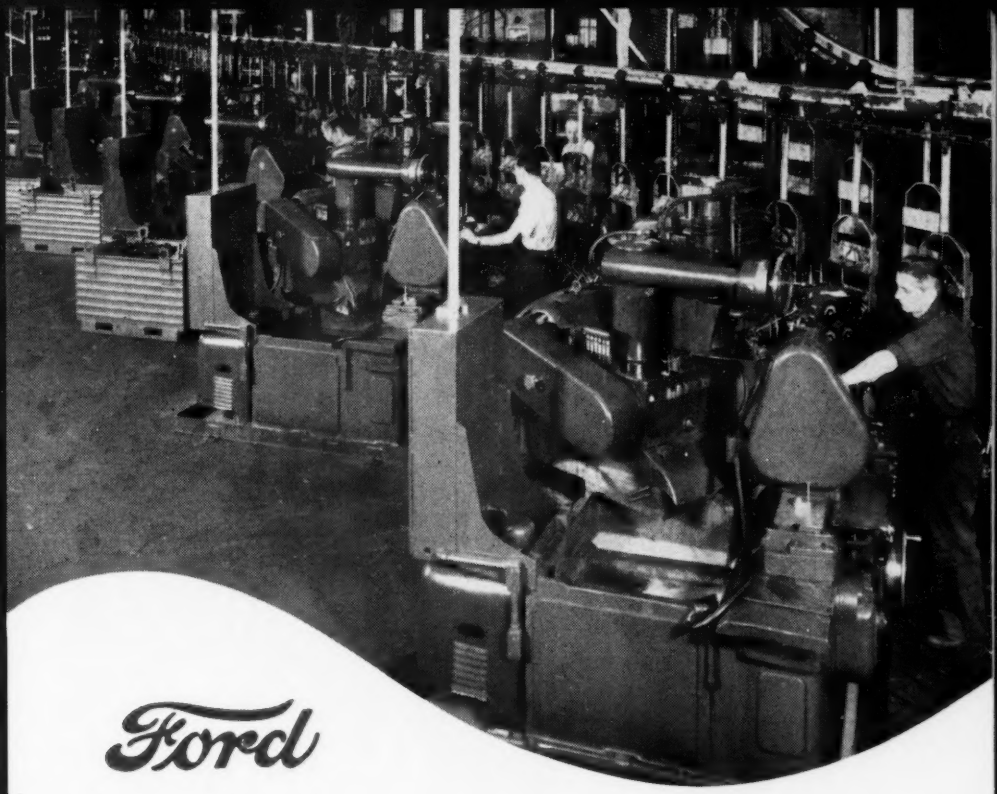
Oper. No.	Operation Name	R.P.M.	Feed	Min.	Sec.
1	Load and mill ribs — Single Point fly cutter	1000	H	1	00
2	Set Up and rough bore — two holes	2000	.0015	2	10
3	Rough face two top surfaces Single Point fly cutter — Remove part to cool —	1000	H	1	35
4	Load and second rough bore two holes	2000	.003	1	50
5	Finish bore two holes	2000	.0015	2	40
6	Check two holes for size			1	00
7	Rough and finish 30° bevel	800	H	3	00
8	Rough and finish one bottom face	800	H	1	00
9	Finish face two top surfaces Out-feed chuck	800	.0025	4	35
10	Rough and finish 2" diameter shoulder	400	H	3	00
	TOTAL TIME			**21**	**50**



Checking hole size—held to 0.0002". Simple holding fixture provides both boring and milling positions.



No. 2 Moore Jig Borer Table Working Surface of 10" x 19"; Accurate lead screws; infinitely variable spindle speeds, 75 to 2400 R.P.M.; 3 power feed ratios.



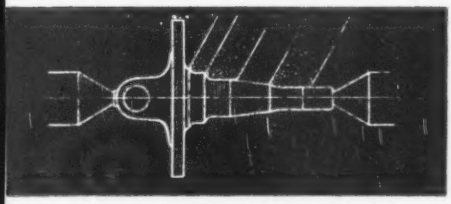
Ford

boosts machine output 4 times

Grinding Operations Combined by Grinding 3 Diameters and 3 Blending Radii in One Operation

- **Less machine investment**
- **Production costs reduced**

Seven LANDIS TOOL 14" x 18" Type CH Plain Grinders with new overhead profile wheel dresser and wheel base set at 30°. These machines in FORD Mound Road Plant have released manpower for more vital jobs.



work data

Name of Part—Front Wheel Spindle
Pieces per Hour—90
Machine—Type CH Plain Grinder with Angle Wheel Base
Stock Removal—.015" on diameter
.009" on faces
Limits—.0005" on diameter
.010" on radius
Material—Steel Forging

141AS

LANDIS
precision grinders

LANDIS TOOL COMPANY / WAYNESBORO, PENNA., U. S. A.



FINEST

- for SPEED
- for ACCURACY
- for VERSATILITY
- for ADAPTABILITY
- for MAINTENANCE

TORQOMATIC by Jarvis

AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS

Finest for SPEED: Taps more quality threads per hour, more holes than any other tapping attachment.

Finest for ACCURACY: Attaches firmly to drill press or tapping device.

Finest for VERSATILITY: Taps anything from soap to nickel steel without pressure on tap—prolongs tap life.

Finest for ADAPTABILITY: Five sizes, standard or built-in models, will fit any drill press or tapping device. 0-1½" cap.

Finest for MAINTENANCE: Requires little or no maintenance.

TORQOMATICS, when used with Jarvis TAPS, make the finest possible combination for low-cost, high-quality tapping. Send for free, illustrated, descriptive literature to The Charles L. Jarvis Company, Middletown, Conn.

Jarvis POWER TOOLS

TAPPING ATTACHMENTS • TAPS and DIES • ROTARY FILES FLEXIBLE SHAFTS and MACHINES • TUNGSTEN CARBIDE REAMERS and MILLS • DRILLS BORING BITS

THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

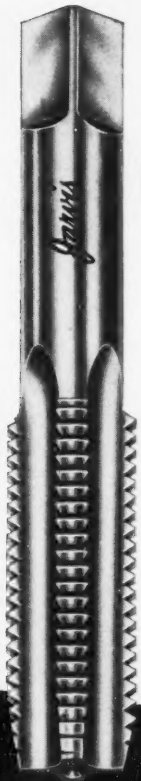
ACCURATE SQUARES

CONCENTRIC SHANKS

UNIFORM FLUTE SPACING

CONTROLLED HOOK

PRECISION GROUND CHAMFER



Custom Made at No Extra Charge

Jarvis TAPS

AN INDUSTRIAL TAP FOR INDUSTRIAL USERS

JARVIS POWER TOOLS

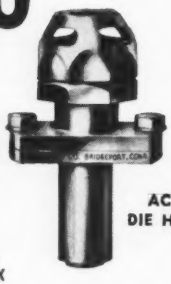
TAPPING ATTACHMENTS · TAPS · FLEXIBLE SHAFTS AND MACHINES · ROTARY FILES · TUNGSTEN CARBIDE REAMERS AND MILLS · DRILLS · BORING BITS

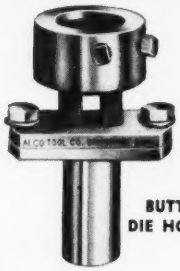
THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

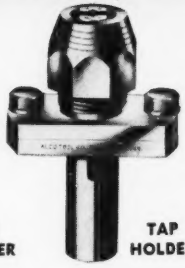


ALCO


DRILL CHUCK

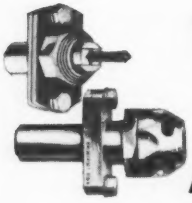

ACORN DIE HOLDER


BUTTON DIE HOLDER


TAP HOLDER

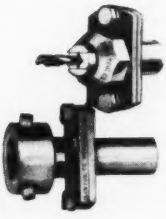
You can completely equip your screw machines with ALCO tools for every drilling, tapping, reaming and thread cutting operation and get more and better production at less cost because . . .

1. No bushings are needed. Drills and taps are held securely. No time lost in making special size bushings.
2. Change the drill or tap size without changing the chuck . . . each ALCO holder will accommodate several sizes.
3. Accurate concentricity is accomplished and guaranteed by the special Alco adjustment.
4. Taps and dies last longer because of the concentric alignment.
5. Every thread cut perfect, no taper threads, no rejects — each one die-true.



THE ALCO TOOL CO.

152 BIRDSEYE ST.
BRIDGEPORT, CONN.



ALCO EFFICIENT TOOLS

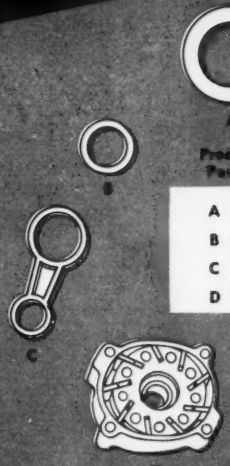
GARDNER Grinders

precision disc

Parallel Sides On a Wide Range of Small Parts Ground in One Operation

Flexible Set-up Speeds Production

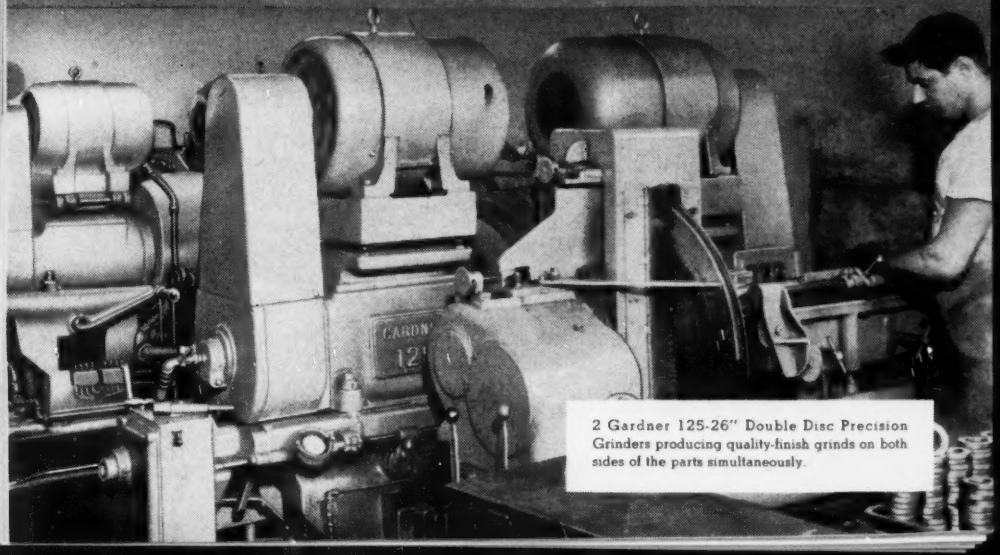
A manufacturer of pumps has a wide range of small parts that require flat surfacing on parallel sides. Both sides are ground at once to close tolerances of parallelism and uniformity. Rotary work carriers, quickly changed for various work pieces, plus horizontal feed troughs, reduce handling and speed production. Here are some typical results:



	Production Per Hour	Material	Tolerance Parallelism & Uniformity	Overall Stock Removal
A	1000	Cast Iron	± .0002"	.020"
B	2500	Hardened Steel	.0015"	.030"
C	300	Forged Steel	.001"	.031"
D	700	Cast Iron	± .0002"	.018"

For help with your flat surfacing problems, send us your blueprints for production estimates and tooling recommendations. Gardner Machine Company, 428 Gardner St., Beloit, Wisconsin, U.S.A.

111-MS

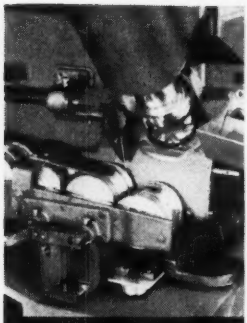


2 Gardner 125-26" Double Disc Precision Grinders producing quality-finish grinds on both sides of the parts simultaneously.

. . . untouched by human hands!

. . . to plus-or-minus .035 oz.!

. . . at 12 per minute rate!



. . . by this amazing new

Morris

AUTOMATIC PISTON BALANCING MACHINE

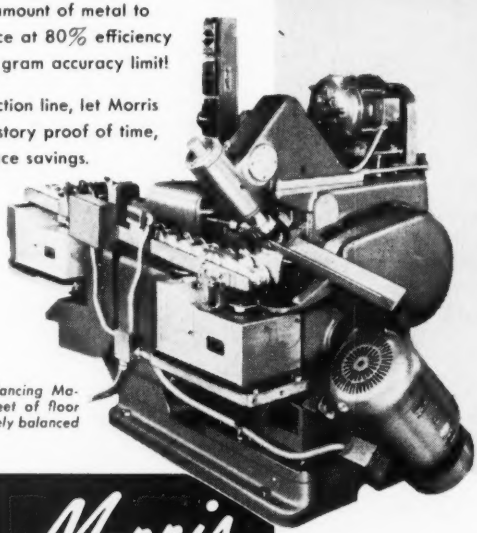
pistons balanced automatically

Pistons are unloaded automatically from a standard conveyor, processed or rejected and returned to the conveyor "untouched by human hands."

Underweight or grossly overweight pistons are automatically rejected without interrupting the production flow. Production is 450 to 720 parts per hour varying with the amount of metal to be removed from each piece at 80% efficiency and to a plus-or-minus one gram accuracy limit!

If you have a piston production line, let Morris Engineers show you case history proof of time, labor, money and floor space savings.

Write today for NEW bulletin describing and illustrating the revolutionary MORRIS Piston Balancing Machine.



The Morris Automatic Piston Balancing Machine takes only 27.3 square feet of floor space to turn out up to 12 accurately balanced pistons every minute!

a better product at less cost with precision PLUS *production*

Gilbert MOR-SPEED Line

Morris

THE MORRIS MACHINE TOOL COMPANY, 934 HARRIET ST., CINCINNATI 3, OHIO



5 tips serve every machine in your plant!

There is no need to stock all the various sizes of Morse, Browne & Sharpe, or Jarno taper centers when the INTOCO line of adapter shanks and 5 sizes of insert tips will do the job.

The INTOCO line of lathe and grinder centers is the result of extensive research and engineering. Centers are of two piece design, consisting of a shank and replaceable tip. INTOCO Center Tips are made in four different alloys to fit the many different applications that the modern shop is called upon to machine.

INTOCO Tips are ground to a fine tolerance and finish, and perfect concentricity is maintained between the O.D. of the shank and the center point.

Learn more about the INTOCO line and how it can increase shop production and save you time and money. Don't delay — write today for free 8 page catalog which gives complete specifications on INTOCO Standard and Gash Type Center Tips.

INTOCO SALES CO.

distributors for INTERSTATE TOOL COMPANY

Engineers, Designers and Builders of Special Machinery, Plant Equipment and Tools

427 W. 58TH ST. CHICAGO 21, ILLINOIS

"Standards or



Specials...

when it comes to DRILLS—

MAKE MINE MORSE

every time!

Whether it's a run-of-the-mill production job ... or a cranky piece of work in non-ferrous or plastics ... production men *who know the score,* know that Morse Drills score highest on *any* job ... both in clean-cut, accurate work, and in number of holes per grind.

Then, of course, if you're shooting for *extra* high score, tell your Morse-Franchised Distributor to give you Morse *ELECTROLIZED.*

It's good business to keep in touch with your Morse-Franchised Distributor as a matter of course. He has the complete stock, the seasoned know-how, and the established capacity for service that makes him *your standby* on any problem involving drills—and any other cutting tool in the complete Morse Line.

MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASS.
(Division of VAN NORMAN CO.)
Warehouses in New York, Chicago, Detroit, Houston, San Francisco

MORSE
Cutting Tools

...buy them by phone from your Morse-Franchised Distributor and save ordering time

"MARVEL" HAS always had the edge



MARVEL High-Speed-Edge Blades assure Faster, more Accurate cutting with proven Economy and complete Safety. Only the MARVEL is a composite blade with a high speed steel cutting edge electrically welded to an exceptionally tough, strong alloy steel body.

The High-Speed-Edge does the cutting while the alloy back with hardened eyes, carries the load. Blade tensions up to 300% higher than those possible with ordinary blades are recommended. This greater tension is confined to the cutting or leading edge by the location of pin holes (exclusive MARVEL design feature) and cannot be overcome by work resistance. Heavier feeds and greater speeds are practical without "run out."

With greater accuracy, higher production and lower cost per cut, come the extra dividend of Safety, for MARVEL High-Speed-Edge Hack Saw Blades are Positively Unbreakable—*they will not shatter.*

Ask your local MARVEL distributor (see classified phone book) to help you modernize your metal sawing with MARVEL High-Speed-Edge Blades. They cost no more than ordinary high speed steel blades.

1. High Speed Steel cutting edge.

2. Tough unbreakable alloy steel body with hardened eyes.

1. & 2. Integrally welded to make a fast-cutting, long lasting composite blade that is positively unbreakable.

ARMSTRONG-BLUM MFG. COMPANY

"The Hack Saw People"

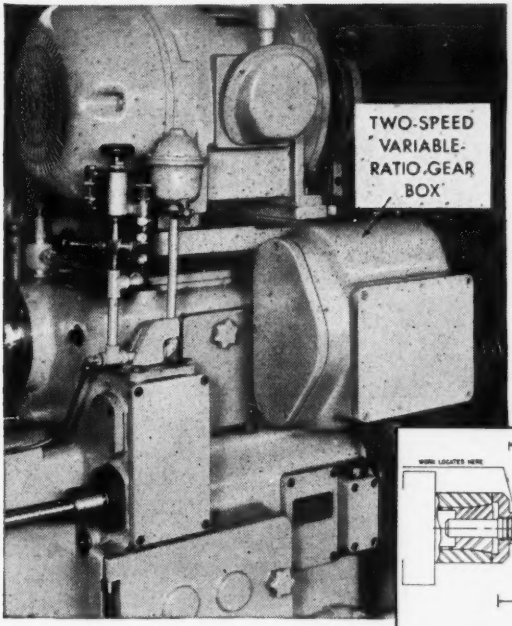
5700 BLOOMINGDALE AVENUE **CHICAGO 39, ILLINOIS**

MARVEL *Metal Cutting* SAWS

Better Machines-Better Blades

MACHINE OF THE MONTH

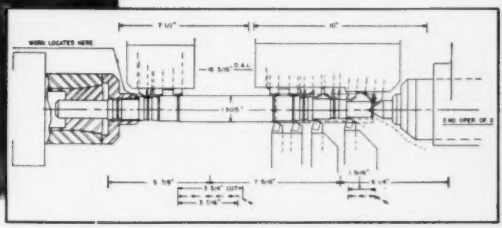
PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



Combined Turning and Squaring Operations at Different Cutting Speeds Now Possible with Lo-swing Automatically Controlled Two-Speed Headstock

Left. View of two-speed, Variable-Ratio Gear Box with Belt Guards removed.

Below. Tooling layout for electric motor shaft.



Problem: To turn, face and undercut shoulders on electric motor shafts, using cemented carbide tools for the turning operations and high speed steel tools for facing, grooving and chamfering operations which require a very smooth finish. Both operations to be made in one handling with automatic spindle speed change between the turning and squaring operations.

Solution: The Model "LR" Automatic Lo-swing Lathe selected for this job was equipped with a Two-Speed, Variable-Ratio, Gear Box shown in the illustration. The speed change from high to low and back to high again in a single machine cycle is controlled by two adjustable cams, mounted on the main cam shaft, which may be set to operate the multiple disc clutch at any time during the machine cycle. The ratio between the high and low speeds may be modified through pick-off gears to suit special conditions without removing or dismantling the gear box.

The tooling layout shows the second of two operations on a 1½" diameter electric motor shaft. The shaft is held and driven, on a previously turned diameter, in an air-operated collet chuck which grips the shaft well in from the end, exposing only the part to be machined. This method reduces the shaft's effective length and eliminates springing due to the rigid grip of the collet. The work is positively located from a previously finished shoulder, insuring accuracy of shoulder lengths.

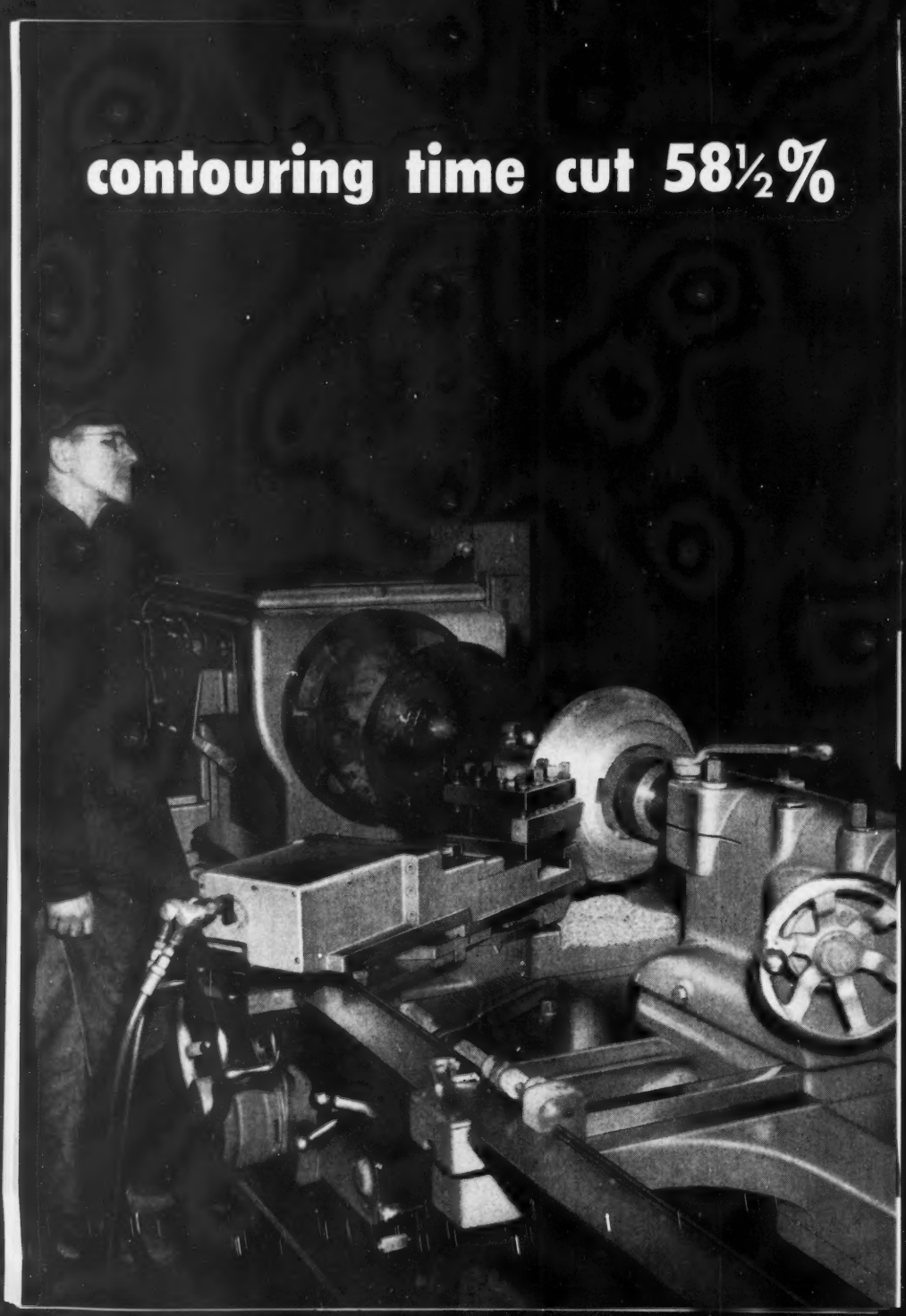
The shaft diameters are turned with sintered carbide tools mounted on the front carriage, cutting at a surface speed of 350 ft. per minute. The squaring and forming tools are mounted on the rear slide and operate at a surface speed of 70 ft. per minute, insuring a very high polished surface on the shoulders and formed grooves. This combination assures high production, coupled with smoothly finished shoulders, both of which are very desirable on electric motor shafts.

Consult Seneca Falls engineers for assistance in solving your automatic turning problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

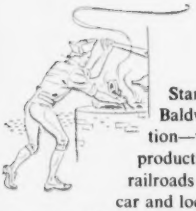
PRODUCTION COSTS ARE LOWER WITH Lo-swing

contouring time cut 58½%



with LeBlond Hydra-Trace

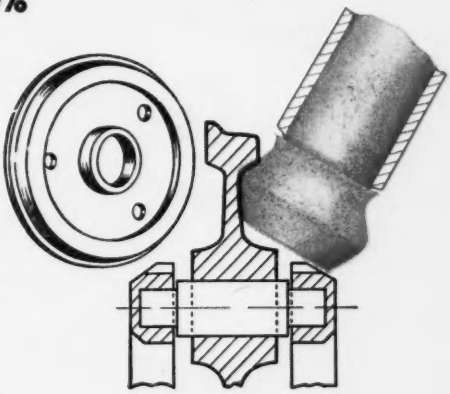
wheel mill roll life boosted 50%



Standard Steel Works Division of Baldwin-Lima-Hamilton Corporation—whose forges first flamed into production in 1795—supplies America's railroads with one-piece, wrought steel car and locomotive wheels. And Standard Steel officials credit LeBlond Hydra-Trace for contributing to their outstanding success in producing these wheels at competitive cost in the quantities needed.

At Standard's Burnham, Pennsylvania Works, rolls of alloy steel are turned to contour and then put to work shaping wheels. The intense pressure and heat of this hot-rolling operation soon work-hardens and wears the rolls out of contour. Formerly a skilled operator—tediously matching contours with a hand-held template—redressed the rolls manually. Four dressings were considered long service for a roll . . . and the work-hardened surface quickly dulled carbide turning tools.

Now, with Hydra-Trace installed on a 25" LeBlond Heavy Duty Lathe, Standard Steel chalks up big savings under all three headings—man hours, material and tool life. As Marty Gotwalt of Swind Machinery—LeBlond's Philadelphia distributor—puts it, "Hydra-Trace automatically keeps the tool just under the work-hardened skin. We've lopped 14 hours off what used to be a 24 hour job."



And that's not all. Minimum metal-removal by the Hydra-Trace method frequently saves Standard's wheel mill rolls for six dressings—*a bonus of two over the manual method.*

Whether your turning problems—like the wheel mill rolls at Standard Steel—center in the toolroom or demand stepped-up output on the production line, Hydra-Trace is ready to help. For all LeBlond Heavy Duty Lathes built since 1935, this template-controlled, hydraulically powered tracer can be mounted in minutes. Templates are flat, compact, and suitable for both rough and finish turning. Call your LeBlond distributor or write

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

Ask for Bulletin HT-2-E for complete details on LeBlond Hydra-Trace

turned faster by

LeBLOND *of Cincinnati*

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • *FOR MORE THAN 64 YEARS*

To be UNVEILED at the Metal Show . . .

Crush Dressing

ON THE DIVERSIMATIC CENTERLESS GRINDER!



Here's the newest thing in centerless grinding—CRUSH DRESSING . . . a better, faster way to impart a perfect profile to face of your grinding wheel! Now you can easily profile grind multi-diameter work on your Diversimatic with extreme accuracy—*frequently profile grind objects direct from the solid!*

See this new CRUSH DRESSER in operation on the Diversimatic at the METALS CONGRESS! It's especially engineered for the Diversimatic. No time-consuming set-ups to make or tear down. Simply press the roll into the wheel and *presto*, your wheel is perfectly profiled across its full width!

Don't miss Booth 1767, National Metals Congress and Exposition, Philadelphia, Oct. 20 to 24!

DIVERSIFIED METAL PRODUCTS CO.

5125 Alcoa Avenue, Los Angeles 58, California

Tap breakage reduced to-



ONE TAP PER 15,000 PARTS!



A Warner & Swasey No. 10 Precision Tapping and Threading Machine tapping four tiny Class 3 holes in the type cap piece for National Adding Machines (shown ½ size at right).

THAT'S the record of the Warner & Swasey No. 10 Precision Tapping and Threading Machine at The National Cash Register Company, Adding Machine Division, Ithaca, New York. The job consisted of tapping four tiny holes for No. 1-72 pitch threads to Class 3 fits on one small part in the adding machine's precision mechanism.

This operation was previously done on a drill press rigged with a tapping head. Tap breakage, despite operators' skill and care, averaged 20 taps a week with 7,000 parts produced.

But when the job was transferred to a Warner & Swasey, 15,000 parts were tapped with only 1 broken tap. The production bottleneck was quickly broken when production was upped from 175 to 300 pieces per hour.

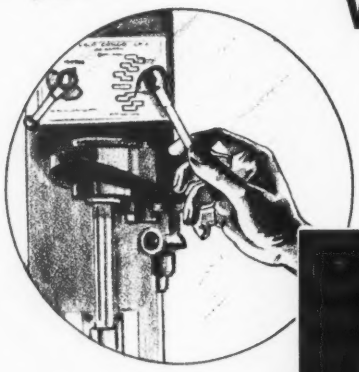
For this company, the No. 10 was a *real* investment. Wherever your operations require precision tapping of Class 3 or 4 threads *on a production scale*, you can depend on Warner & Swasey Precision Tapping and Threading Machines to reduce tap breakage, and practically eliminate costly rejections of parts due to inferior tapping in the final operations.

WARNER & SWASEY
Cleveland

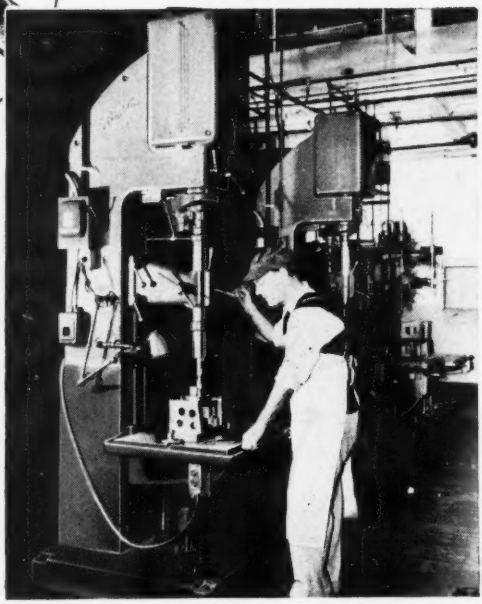
YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY TURRET LATHES, AUTOMATICS AND TAPPING MACHINES

"Buffalo" Tips on Better DRILLING

VARIABLE SPEED DRIVE *REDUCES* SETUP COSTS



Speed changes required for different drilling jobs add up to quite a time item, but not so with the "Buffalo" RMPster Drill. Its variable speed drive allows the operator to select any of 101 speeds instantly by moving a lever and without shutting off the motor. Thus, with speed-change time eliminated, setup changes are made much faster, and costs are cut. These 99"-high precision drilling machines are saving money and time in tool rooms and machine shops throughout the industrial world. For complete engineering details, write for Bulletin 3257.



Two "Buffalo" No. 3 RPMsters turning out defense work in a large plant.

DIAMOND JUBILEE 75 YEARS ANNIVERSARY

"Buffalo" MACHINE TOOLS

BUFFALO FORGE COMPANY

388 BROADWAY BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING SHEARING CUTTING BENDING

"doing a job" at TOOL STEEL *



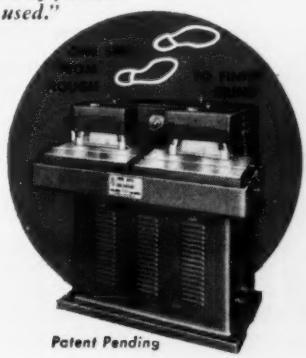
"Doing a job" is right!

30% decreased grinding time, grinding costs way down, less operator fatigue, greater wheel life, increased production.

* Here's what the Tool Room Superintendent at the Tool Steel Gear and Pinion Co., Cincinnati, Ohio says:

"Since installation this Standard Tool Grinder has had no downtime . . . required no maintenance other than routine. We use the machine daily, sometimes continuously on production wet-grinding of carbide tipped hub-turning, offset turning, boring and other high-speed steel tools. It's by far the best precision grinder we've used."

Outstanding performance? No . . . just typical of the Standard Twin Wheel Tool Grinder. Available in 10" and 14" wheel sizes; wet or dry. No spray or splash when wet-grinding. Two operators can grind at once. Conserves floor space. Write for Bulletin TW today for full details.



Patent Pending

standardize with . . .

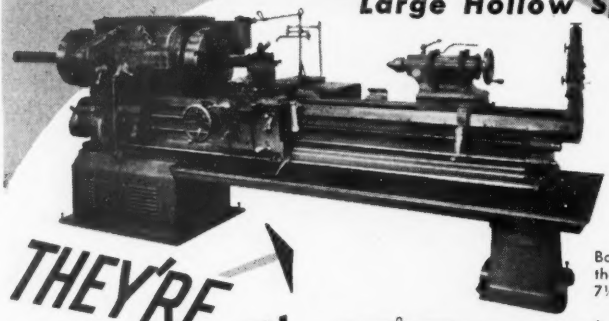
the STANDARD electrical tool co.

2487 RIVER RD. • CINCINNATI 4 • OHIO

FOR FASTER PRODUCTION, BETTER WORK, LOWER COSTS—

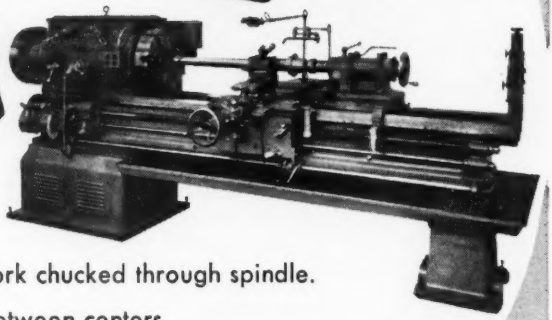
HYDRATROL LATHES

Large Hollow Spindle Type



Both Illustrations Show the 18" Hollow Spindle 7⅛" Hole

THEY'RE VERSATILE!



- Machine long work chucked through spindle.
- Machine work between centers.
- Also built with beds and carriages on each end of headstock for machining both ends of a shaft at one time.

SIZES 18" TO 36"

Small — 18" & 20" up to 7⅛" Hole
Medium — 25" up to 12" Hole
Large — 32" & 36" up to 16⅛" Hole
(Standard Type Lathes 16"-36")

IMPORTANT FEATURES

Timken Bearing Spindles.

Hydraulic clutches for forward and reverse, controlled from apron or headstock.

Hydraulic brake for close position control.

Hydraulic clutches self-compensating. No adjustment and full power capacity at all times.

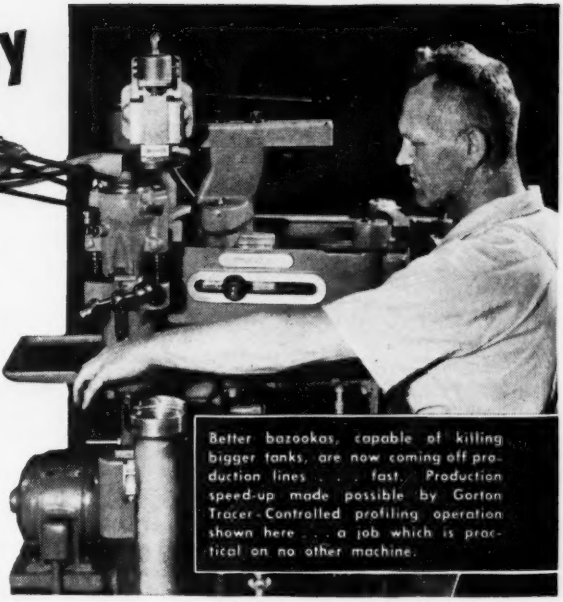
LEHMANN MACHINE COMPANY

CHOUTEAU AT GRAND • SAINT LOUIS 3, MISSOURI

Pantography at Work

★

Inside profiling operation produces more than 36 pieces per hour with Gorton Tracer Control. Approximate time by the next best method . . . one piece every two hours.



Better bazookas, capable of killing bigger tanks, are now coming off production lines . . . fast. Production speed-up made possible by Gorton Tracer-Controlled profiling operation shown here . . . a job which is practical on no other machine.

GORTON

• IMPROVES QUALITY
• INCREASES PRODUCTION • CUTS COSTS

On many all-but-impossible jobs, Gorton Tracer-Controlled Pantographs and Duplicators speed up production on military or industrial contracts. High surface finish results from spindle speeds up to 45,000 R.P.M. Accuracy results from the use of over-size masters, patterns, or templates together with the reduction ratio which is exclusively characteristic of the pantograph. Whether a dozen or a thousand pieces, each is identical to the first. Work piece size varies from instrument parts to areas of 10 to 20 feet.

Gorton tracer-controlled equipment quickly pays for itself in profiling, routing, die sinking, mold cutting, counterboring, chamfering, grooving, graduating, engraving as well as many other standard or special operations on ferrous or non-ferrous metals and plastics where work is flat, uniformly curved, cylindrical, spherical or irregular in shape.

Mail the coupon below for General Catalog illustrating the complete Gorton line.

PRODUCTION DATA—

JOB: Profile 6 locking lugs for male and female sections of new 3.5" Bazooka

MATERIAL: Aluminum alloy

CUTTER: 5/32" dia. single flute, fast spiral H. S. steel running at 3,900 R. P. M., without coolant

MASTER: 2 masters: one for male and one for female sections; 3 times oversize, traced manually

HOLDING FIXTURE: Pneumatic-operated internal expanding type

APPROX. TIME: 36 pieces per hour

ALTERNATE METHODS: None practical

GEORGE GORTON MACHINE CO.



1710 Racine St., Racine, Wis., U.S.A.

Please send at once complete information about the Gorton line contained in Bulletin 1655-1719.

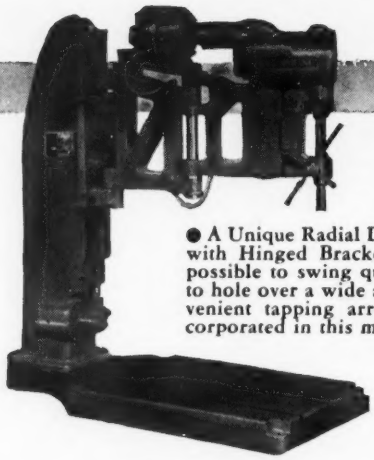
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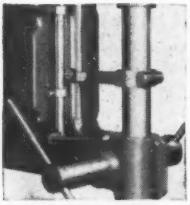
City, State .....

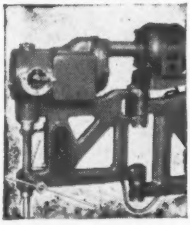


● A Unique Radial Drilling Machine with Hinged Bracket that makes it possible to swing quickly from hole to hole over a wide area. A very convenient tapping arrangement is incorporated in this machine.

a time-tested line of machine tools

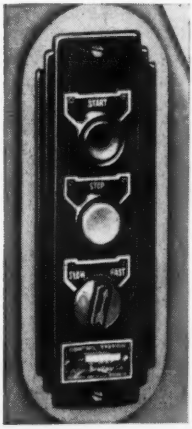
engineered for production





● Here is a machine designed to perform light drilling and tapping operations at high speed with a minimum of effort. Any one of six spindle speeds may be quickly selected and tapping is always instantly available without any adjustments to the machine. It makes an excellent choice for miscellaneous work on a large layout of varying size holes.

THE FOOTE-BURT CO., Cleveland 8, Ohio
Detroit Office: General Motors Building



FOOTBURT

machine tools

ONE of AMERICA'S PRINCIPAL PRODUCERS of DRILL JIG BUSHINGS

ANNOUNCES ABC Precision Quality Piercing Punches

of premium steel, in two basic types:
Water Hardening Tool Steel — and High Speed Steel



The high quality performance of a punch depends upon:

(a) The Correct Quality Steel

(b) Precision Heat Treatment to gain full advantage of its properties

(c) Qualified Workmanship to insure dimensional accuracy

To these basic requirements must be added modern equipment to make possible production at reasonable prices. We have taken every possible step to produce an outstanding punch.

The water hardening tool steel we have selected is guaranteed to definite standards of grain size and depth of hardenability. For "shock absorber" action, the head and upper part of the shank are drawn back to 45-50 Rockwell C in such manner as to have a hardness gradient, rather than a sharp line of demarcation between different sections.

The underside of the head is ground slightly at the same time as the shank. This insures squareness of the underside of the head with the shank, and minimizes breakage during stripping.

RELATED CONCENTRICITY — As a further example of the "built-in" qualities of A • B • C Precision Punches: the point is ground concentric with the body, within .0005" total indicator reading.

To achieve these A • B • C advantages, plus fine finish and smoothly blended radius to minimize stresses, we developed within our own organization special grinding fixtures and dressing equipment not found in outside markets. And, back of all this is our long record as one of the country's principal producers of premium quality drill jig bushings and fine precision parts for the automotive and other industries.

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ENGINEERING OFFICE AND REGIONAL WAREHOUSE:
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REPRESENTATIVES IN ALL IMPORTANT INDUSTRIAL CENTERS
WRITE FOR LITERATURE AND NAME OF YOUR LOCAL REPRESENTATIVE



STANDARD CARBOLOY TOOL PRODUCTION TIPS

1. A large radio manufacturer solved several of its trickiest, toughest automatic screw-machine problems by ignoring accepted practices and switching from steel tools to cemented carbide tools. First, a modified Standard Carboloy Tool (Grade 883 carbide tip) is used to turn B-1113 steel. Finish and accuracy are exceptional — *and tool life is extended to 50 to 60 hours of continuous production.*

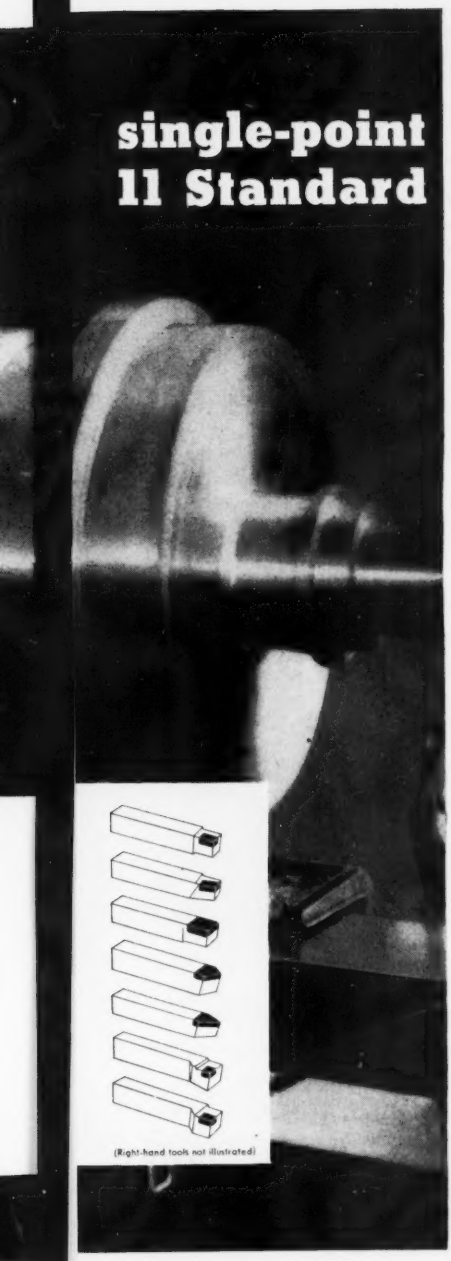
Second, high-speed steel tools failed completely on the cut-off job when positions were decreased from 3 to 2, and feed was increased from .0024" to .0037". Again breaking with tradition, this manufacturer cuts the B-1113 steel to dead center with Standard Carboloy Tools using Grade 883 tips.

2. A large motor-car company now performs nine roughing operations simultaneously on a 13½" O.D. cast aluminum converter pump with a special tool head incorporating modified Standard Carboloy Tools. The operation consists of 9 cuts — 3 facing, one boring, 3 combined boring and facing cuts, and 2 combination facing and chamfering cuts.

Total feed is .012" per revolution. Cutting speeds range as high as 3400 SFPM, spindle speed 800 rpm. *Output per machine per hour is tripled.*

If these cemented carbide applications suggest Standard Carboloy Tool uses you would like to explore further, please get in touch with your Carboloy representative.

single-point machining with 11 Standard Carboloy Tools



(Right-hand tools not illustrated)

11 Standard Carboloy Tools will do up to 80% of all your single-point turning, facing and boring . . . eliminate hundreds of costly, inventory-loading special tools.

What's more, fast-cutting Standard Carboloy Tools boost production as they chop tool and maintenance costs. *This has been proven in all types of shops on an industry-wide basis.* Tipped with the quality brand of cemented carbides, Standard Carboloy Tools easily outproduce and outlast steel tools by as much as 10 to 1 or more.

Cut faster, better, for less

Why not test Standard Carboloy Tools on your toughest job? Prove for yourself that whether used "as is" or quickly and economically ground to special shapes in your own toolroom, Standard Carboloy Tools will do your single-point machining jobs faster, better, for less.

And don't overlook the plus-values in Standard Carboloy Blanks. They're available in many styles; mass-produced at low cost in hundreds of sizes. They're easily brazed to tool shanks to handle those emergency jobs, without time or money wasted waiting for specials.

Extra carbide benefits

Carboloy-Developed Services lead to more efficient selection, design, use and maintenance of cemented carbide tools, result in *extra* carbide benefits. Services include Customer Training School, technical manuals, charts, catalogs, low-cost slide films . . . and on-the-job assistance of skilled Carboloy engineers to crack specific carbide problems.

Write for complete Carboloy General Tool Catalog, GT-250, or contact your local Carboloy Sales Engineer or Authorized Distributor today.

"Carboloy" is the trademark for the products of Carboloy Department of General Electric Company

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

11143 E. 8 Mile Ave., Detroit 32, Michigan

Plants at Detroit, Michigan; Edmore, Michigan; and Schenectady, N.Y.

NOTE:

Magnet ideas to speed up general shopwork

See how Carboloy Permanent Magnet Sheet-Steel Separators prevent feeding of doubles. How permanent magnets give an extra "hand" in general shop work, including . . . magnetic stands, tool-holding devices, sweepers' pick-up tools, magnetic paper grippers on machines, containers for small parts and magnetic retrievers. (Write for Carboloy Magnet Ideas Kit, PM-102.)



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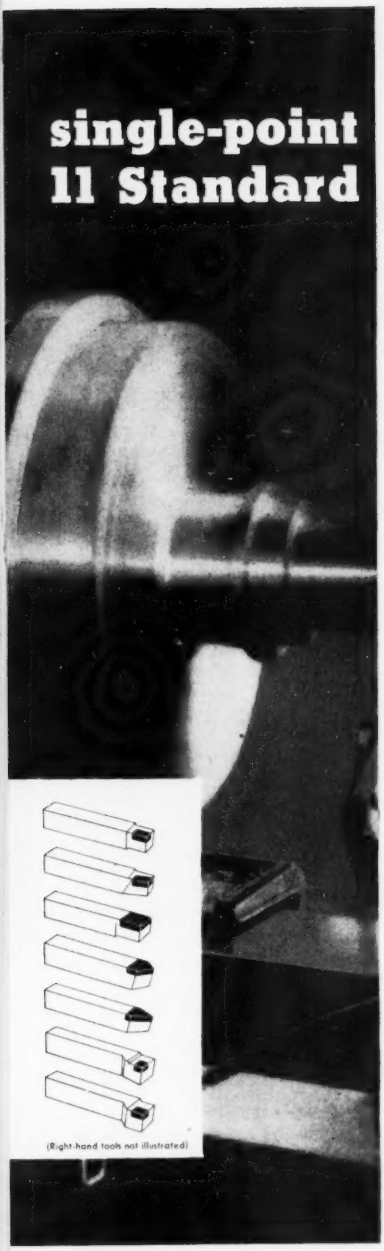
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FAMED for PRECISION



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William Tell Met The Supreme Test For Sureness of Hand and Precision of Aim

According to legend, the Swiss Hero, William Tell, refused to bow before a tyrant and consequently was ordered to shoot an apple off his own son's head. His courage and precise aim led to his undying fame and the later freedom of his country.

Universal Tool and Cutter Grinders

Famed for Precision

Give Guaranteed Accuracy



Costs go down—production goes up—when you equip with the Oliver Ace Tool and Cutter Grinder. Difficult cutters offer no problem—they can be ground easily on the Oliver Ace. Designed and built to give guaranteed accuracy, the proved, dependable Oliver Grinder excels on high speed and tungsten-carbide work.

The Oliver Ace is soundly engineered, efficient and economical to operate—requires no computation, yet handles a wide range of cutter grinding. It's faster on most grinding operations—the set-up is simple—the operation easy. The direct reading for clearances reduces fatigue, eases the operator's job (no stoop... no squat... no squint).

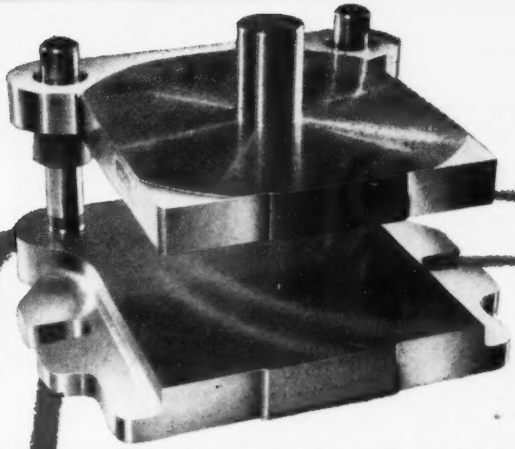
Priced to meet your budget, the ACE excels for grinding face mills up to 15"—also, slab mills • slitting saws • dovetail cutters • angular cutters • double angle cutters • Fellows helical cutters • reamers • taper reamers • production gashing.

2 MODELS: Standard and Heavy Duty (illustrated).

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AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS—DRILL POINT THINNERS—TEMPLATE TOOL GRINDERS—FACE MILL GRINDERS—DIEMAKING MACHINES



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helped FORD retool for '52

Somewhere behind the scenes in almost every outstanding mass production operation, you'll find Danly Die Sets at work . . . saving time in the die shop and assuring longer production runs in the press room. Danly Die Sets are the first choice of diemakers everywhere.

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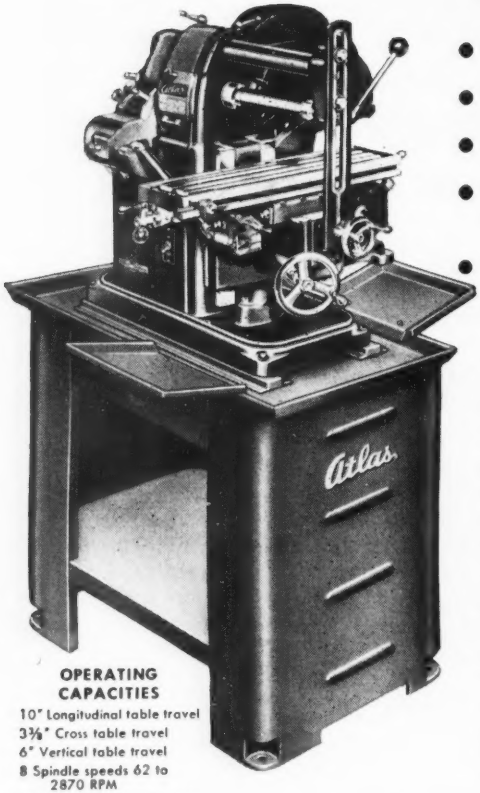
DIE SETS AND DIEMAKERS' SUPPLIES

MORE EFFICIENT MILLING
OF SMALL PRECISION PARTS

TIMKEN BEARING EQUIPPED

Atlas

MILLING MACHINE



- Complete V-belt drive
- Handles full range of milling operations
- Timken bearing equipped
- Choice of manual, Production lever, or Change-O-Matic power feed
- Lowest cost miller on the market

OPERATING CAPACITIES

10" Longitudinal table travel
3⅛" Cross table travel
6" Vertical table travel
8 Spindle speeds 62 to 2870 RPM
.186" to 11.250" Feed range per minute

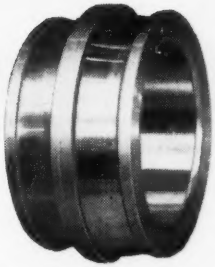
YOU PUT the milling of small precision parts on a maximum-efficiency basis with the Atlas. It performs the full range of milling — from slabbing and facing cuts to end milling, keyways, finishing, and layout work — with the same exacting precision and dependability of large expensive machines . . . *at lower cost.*

It saves many hours monthly on set-ups, saves on power and operating costs — frees bigger machines for jobs that only they can handle. Every feature of larger machines "built down to size" make this the outstanding low-cost miller. Your Atlas distributor will gladly supply full details, or write for complete catalog.

ATLAS PRESS COMPANY
1012 N. PITCHER STREET, KALAMAZOO, MICHIGAN

Atlas DEPENDABLE QUALITY TOOLS SINCE 1911

SKF RACES Against Time...



with the

GISHOLT NO. 24 HYDRAULIC AUTOMATIC LATHE

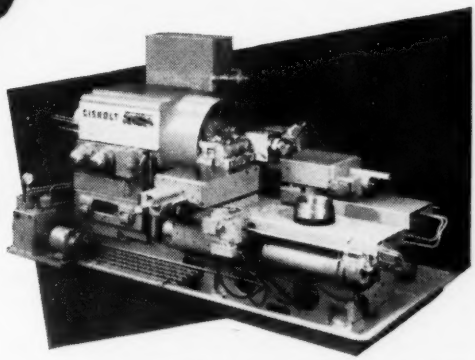
When it comes to fast production of top quality spherical roller bearing races, SKF doesn't fool.

These big Gisholt No. 24 Hydraulics remove 34 lbs. of metal in two operations in a total of only 2.80 minutes' machining time on each of two machines. All cutting is on 52100 bearing steel and done at speeds of 325 to 350 f.p.m.

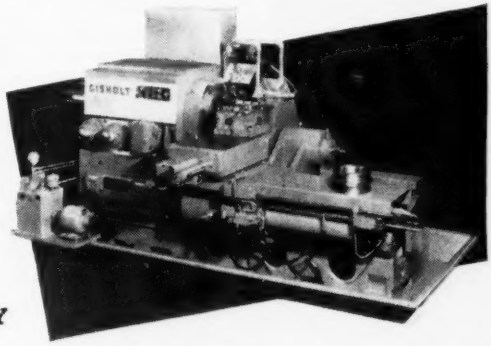
Speed is important, of course. But precision is the governing factor. How the Gisholt No. 24 does the job is a story that might mean real savings for you, too.

The No. 24 Hydraulic Automatic Lathe is a larger version of the famous No. 12 that has an outstanding success record on hundreds of jobs. If you have large volume precision work up to 24" diameter, the Gisholt No. 24 is the machine to investigate. Write for full information.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin



First Operation: Chucked on OD with 3-jaw hydraulic chuck, part is turned up to the jaws, faced, chamfered, bored and bore radius formed. Cam relief on rear tool block turns boring bit clear of workpiece as it is withdrawn.

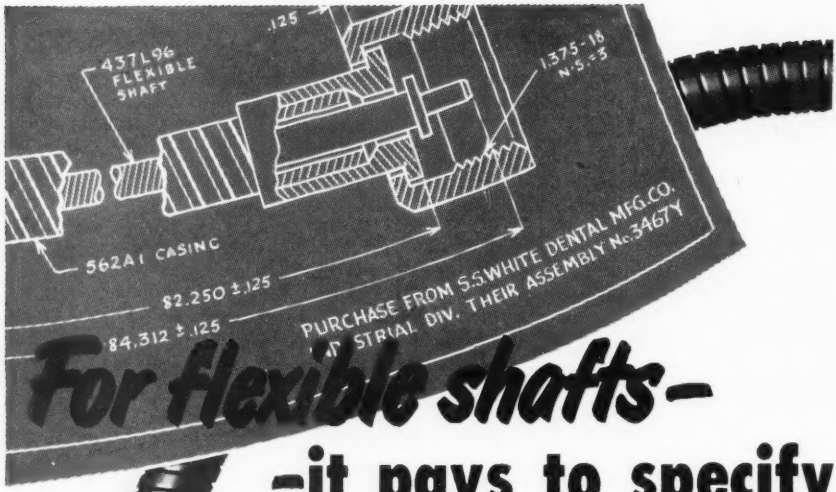


Second Operation: Part held on expanding arbor by hydraulic pressure is finish turned, faced, chamfered and bore radius formed. Special rocker arm type carriage at rear tips in shaving tools to form both roller grooves with feed of .003" to .0045."

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

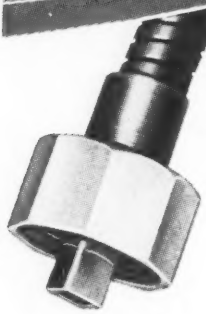
GISHOLT

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SUPERFINISHERS • BALANCERS • SPECIAL MACHINES



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SEND FOR THIS 256-PAGE FLEXIBLE SHAFT HANDBOOK

Complete facts and data on flexible shaft construction and characteristics. Copy sent free, if you write for it on your business letterhead and mention your position.



THE S.S.White INDUSTRIAL DIVISION
DENTAL MFG. CO.

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NEW YORK 16, N. Y.

WESTERN DISTRICT OFFICE • TIMES BUILDING • LONG BEACH, CALIFORNIA



Machine Against Muscle

THE STORY OF WHY A FAMOUS COMPANY SEES FIT TO TAKE A NEW NAME

In 1924 the dream of a man named Joseph W. Sullivan was realized in a revolutionary new tool that was to take the industrial world by storm. The portable power saw was born and a young company was off to a flying start.

Inevitably, the success of this new power tool attracted imitators, brought others to the field. In spite of this, Skilsaw, Inc. maintained a leadership which continues to keep it first in the field.

With this remarkable growth came stronger and stronger demand from *all* industry for *other* kinds of power tools built with SKIL Quality, *other* ways to replace muscle with machine and do jobs better, with less work in less time. Skilsaw, Inc., has answered this demand—now offers more than 160 different models of portable power tools, each one an example of the finest engineering and quality in the field—SKIL Quality!

So it is with justifiable pride that we now alter a corporate name we have in simple fact outgrown. Hereafter, the company long known as Skilsaw, Inc., will be known as SKIL Corporation, the name to be remembered in the manufacture, sale and service of portable power tools for all industry.

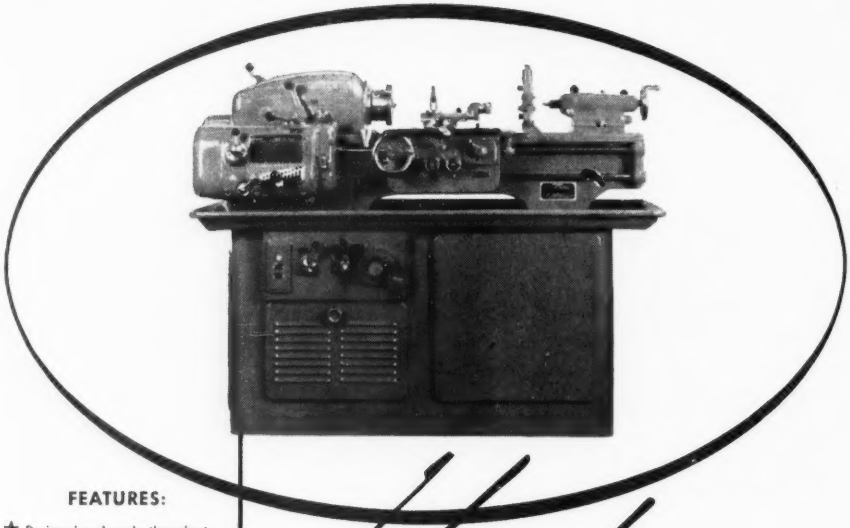
SKIL Corporation

formerly SKILSAW, Inc.

5033 ELSTON AVENUE, CHICAGO 30, ILLINOIS

SKIL PORTABLE TOOLS

26 DIFFERENT TOOLS BESIDES SAWS . . . IN OVER 160 MODELS



MODERN Hendey

9" x 24" TOOL AND GAGE-MAKERS' LATHE

FEATURES:

- ★ Designed and made throughout for PRECISION.
- ★ Hardened and precision ground bed ways.
- ★ Sixty-six thread cutting and feed changes without gear change.
- ★ ALL spindle speeds are stepless, 25 to 2000 RPM, forward and reverse.
- ★ Choice of M. G. Variable Speed or new Hendey Electronic drive.
- ★ Spindle runs in preloaded, super-precision, anti-friction bearings, both ends.
- ★ Super-precision lead screw.
- ★ Safety features preventing simultaneous engagements of belt feed with gear feed, and lead screw with rack feed.
- ★ Separate feed rod (independent of lead screw).
- ★ Special clamping device for tailstock.

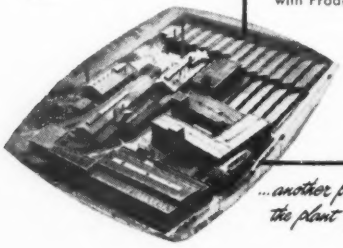
THE HENDEY MACHINE CO. HARDENED AND GROUND BED WAYS

FEATURING HARDENED & PRECISION GROUND BED WAYS

The Hendey 9" x 24" Tool and Gage-Makers' Lathe is a high-speed precision lathe — designed to satisfy the universal demand of expert tool and gage makers for a precision lathe of heavier design and greater adaptability. It has a swing over the ways of 10¼" and over the cross slide of 5⅛". Maximum capacity of spring collets is 1⅛". A choice of the M. G. Variable Speed Drive or the new Hendey Electronic Drive is available. This tool and gage-makers' lathe will perform all operations within its scope most accurately and efficiently — it will save time and money, and eliminate spoilage of work chargeable to inaccuracy, insensitivity or incapacity of lathe equipment.

Hendey is especially qualified to manufacture such a lathe, because, for more than 70 years it has made lathes which have proved its claim of "Prestige with Production."

Write for free illustrative catalog on the Hendey 9" x 24" Lathe



...another product from the plant of precision!

the hendey machine company

MAIN OFFICE & PLANT: TORRINGTON, CONN.
BRANCH OFFICES: New York, Chicago, Boston, Detroit, Rochester, Los Angeles, San Francisco
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AT E. C. ATKINS & CO.

A Lindberg Induction Heating Unit brazes carbide tips on circular saws



E. C. Atkins & Co., Indianapolis, Indiana, manufacturer of saws has joined the long list of companies using Lindberg Induction Heating Equipment. Atkins uses a 5 KW unit plus a specially designed fixture to braze carbide tips on circular saws.

This unit as well as many other Lindberg units in all sections of the country are piling up good production records . . because they are ruggedly built.

These construction features tell an important part of the story:

Checklites . . A system of indicating lamps instantly reveals any abnormal operating conditions . . simplifies servicing.

Work coil burn-out protection . . An electrical interlock system makes it impossible to turn on power when cooling water is not flowing.

Long-life industrial tubes feature shortened internal structure . . Kovar metal-to-glass seals . . heavy walled anodes.

Sealed tank capacitors are hermetically sealed against dirt and dust . . require no servicing or refilling.

For your production brazing, soldering, hardening, annealing, stress relieving, hot forming, forging or shrink fitting requirements, investigate Lindberg Induction Heating Units. Ask for Bulletin 1440.

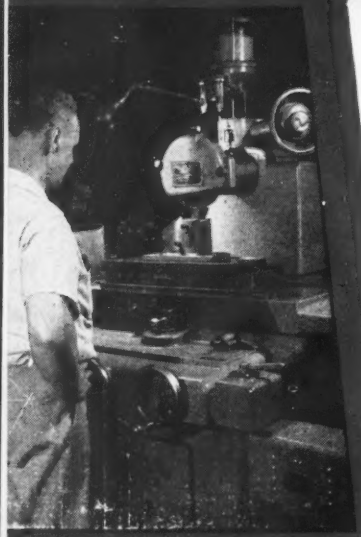


LINDBERG

HIGH FREQUENCY DIVISION

LINDBERG ENGINEERING COMPANY,
2469 West Hubbard Street Chicago 12, Illinois

. . . CAN YOUR SURFACE



Rigid DoALL Surface Grinders Can Take Heavier Cuts and Produce Precision Work Faster

TRY THE TEST illustrated at the right. Take the heavy cut, reverse the crossfeed and let the wheel run back over the ground surface. If it sparks it is grinding again, showing that the wheel didn't take the full depth of cut on the first pass. If it is a DoALL Grinder it won't spark.

This demonstration proves the great rigidity of the DoALL Grinder, shows why it will do a given job in less time. You can take a heavier cut without "give" in the spindle or the table. The wheel doesn't climb over the work piece—it cuts true in one pass.

COOL GRINDING. With DoALL "Cool-Grinding"* you can take these heavier cuts without burning the work. Coolant flows in at the hub, *through* the wheel and out *at the point of contact* in a fine mist. There is always coolant where the heat is generated, unlike flood cooling where the wheel blasts the coolant away from point of contact.

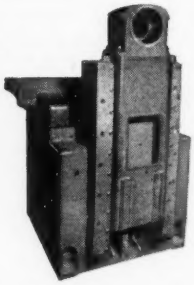
There is a DoALL Surface Grinder for every toolroom or production requirement. Call your local DoALL Sales-Service Store today or write:

THE DoALL COMPANY
254 N. Laurel Ave., Des Plaines, Ill.
35 Local Sales-Service Stores in North America

*U. S. Patent No. 2470350

"Our DoALL Grinder is 50% faster than previous machine and tool life is increased 30% because of better finish", says Toltool Corporation, Milwaukee, Wisconsin.

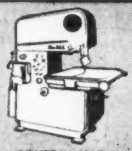
HERE'S WHY DoALL PRECISION HYDRAULIC SURFACE GRINDERS ARE FASTER, MORE RIGID, MORE ACCURATE!

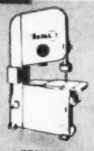


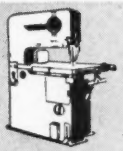
MASSIVE FRAME—column support and base are single-piece chrome nickel steel casting, strongly ribbed for great rigidity.

GR-65




CONTOUR-MATIC


ZEPHYR

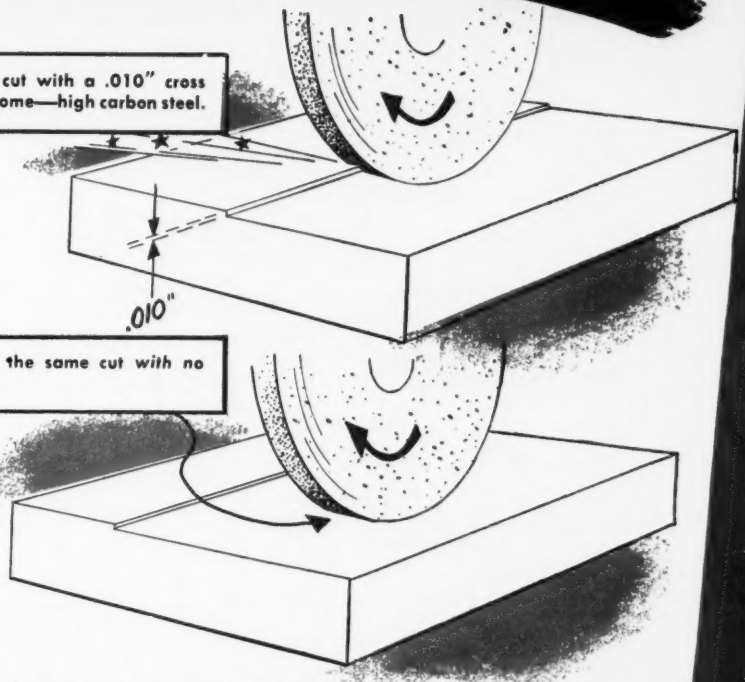

CONTOUR


BAND FILER


SAW BANDS

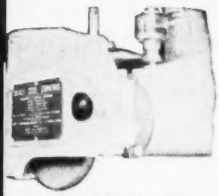
GRINDERS DO THIS?

1. Take a .010" cut with a .010" cross feed in high chrome—high carbon steel.

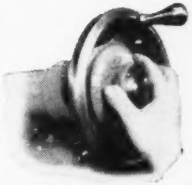


2. Run back over the same cut *with no spark out!*

You can see the above test as part of a complete demonstration of a DoALL Precision Surface Grinder right in your own plant, without cost or obligation. Call your local DoALL Sales-Service Store today.



HUSKY SPINDLE SUPPORT, dowelled and bolted to column, prevents wheel from chattering or springing away from work.



VERTICAL FEED IN INCREMENTS OF .0001" — made possible by rigidity and precision of extra-long 30" column.



Ask for Descriptive Catalog

DoALL



TOOLROOM GRINDER



CRUSH GRINDER



CAGING EQUIPMENT



MONOLITE

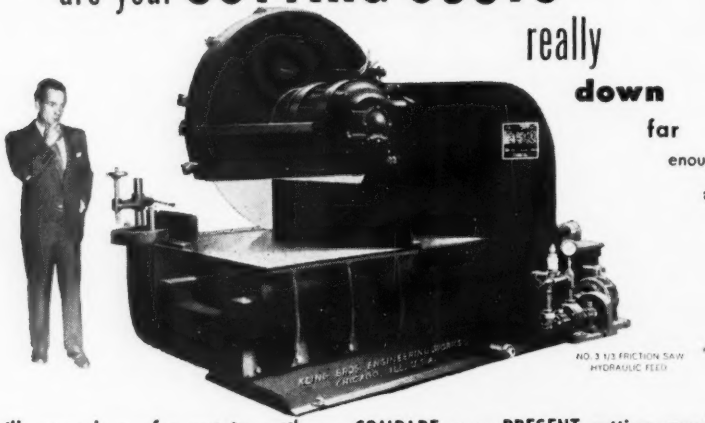


MOBILE INSPECTION UNITS



TOOL STEEL

are your CUTTING COSTS really down far enough ?



you'll never know for certain until you COMPARE your PRESENT cutting speed with

the faster Kling *HIGH SPEED* FRICTION SAW!

What is friction sawing?
It is a proven means of using mechanical heat to cut steel. The weakened steel is removed by each succeeding section of the cooled saw blade—with no apparent wear on the blade.

Fastest, all-around cut-off machine in the shop.
No set-up changes required to cut any sequence of structural shapes. No distortion. One Kling Friction Saw will take the place of several separate shears or slow speed saws. Cuts alloy steels, too, in record time. Because blade life is measured in thousands of cuts, you eliminate downtime and save on tool costs.

Free friction sawing information. *Write today for free booklet on Friction Sawing. Learn how you can profitably apply Friction Sawing in your plant.*



KLING BROS. ENGINEERING WORKS
1328 N. Kostner Ave., Chicago 51, Illinois

How long would it take you to cut these pieces?		Cut it with a Kling in † . .
24" 100 lb. I Beam	⊢⊣	28 seconds
15" 55 lb. Channel	⊏	15 seconds
8" x 8" x 34.3 lb. H Beam	H	10 seconds
100 lb. A.R.A. Rail	I	9 seconds
6½" x 6½" x 19.8 lb. Tee	T	5 seconds
8" x 8" x ¾" Angle	∧	11 seconds
3" Square	■	10 seconds
4" Round	●	15 seconds
6" O.D. Tube, ½" Wall	○	11 seconds

† Approximate Times

6008MM

in our 60th Year

Kling *...an investment in speed!*



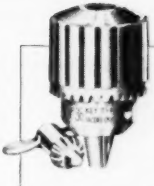


BRIGHT SPOT *in your production picture*

Industry's Overwhelming First Choice for top performance under toughest conditions of heavy duty drilling is the Jacobs Ball Bearing Super Chuck. Precision-built for high accuracy and tremendous strength . . . plus the most powerful grip ever devised . . . it is one of the most dependable of all production tools.

Jacobs Chucks are stocked and sold by your Industrial Supply Distributor.

The Jacobs Manufacturing Co., West Hartford 10, Conn.



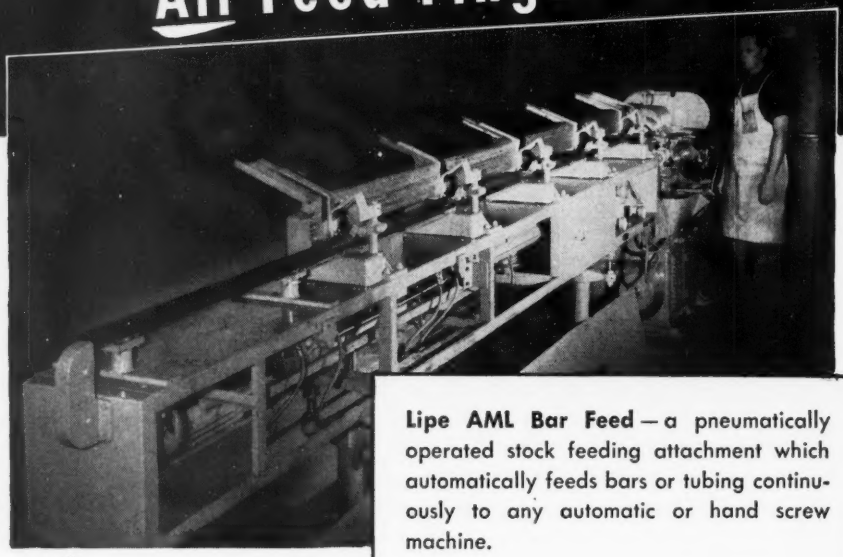
Another World Leader. The same special steel alloys, rugged construction and precision craftsmanship combine to make the Jacobs Plain Bearing Chuck unequalled for light and medium duty drilling. It is the world's most widely used chuck.

IF IT'S A

JACOBS

IT HOLDS

Eliminates All Feed Finger Costs!



Lipe AML Bar Feed — a pneumatically operated stock feeding attachment which automatically feeds bars or tubing continuously to any automatic or hand screw machine.

Lipe Automatic MAGAZINE LOADING BAR FEED

ELIMINATES FEED FINGERS—A pusher rod *behind* the stock feeds it through the collet. Abolishes feed fingers—saves feed finger replacement and repairs.

ELIMINATES REJECTS—Other than the collet, nothing grips the bar. There's no feed finger scratching, marring or deforming of highly polished stock.

CUTS CYCLE TIME—Eliminates multiple feed finger feed-outs. Feeds stock up to 16" long in one operation. There's no idle operation, no "cutting air."

And in addition . . .

- Increases output 30% or more!
- Enables operator to attend many more machines!
- Pays for itself within one year!

We Stand Back of This . . . Lipe AML Bar Feed will enable your screw machine to produce at least 90% of its gross geared production capacity.

Lipe - ROLLWAY CORPORATION

Manufacturers of Automotive Clutches and Machine Tools

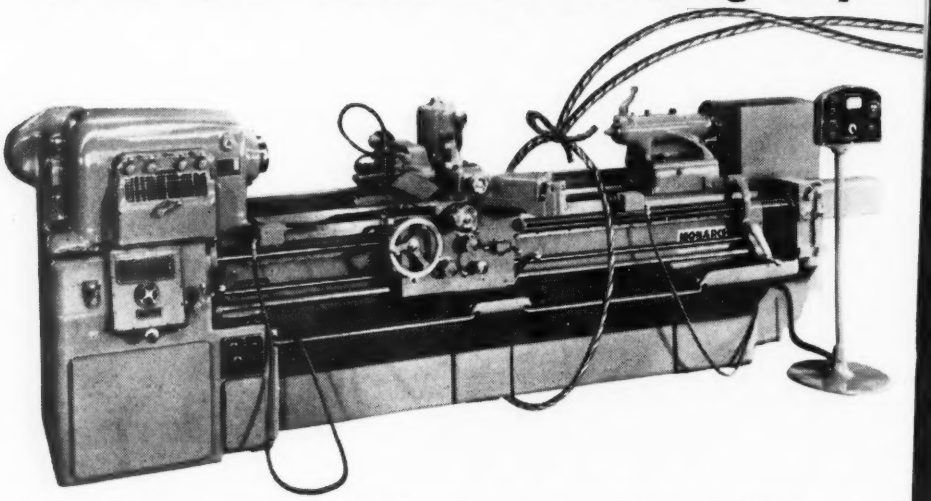
Syracuse 1, N. Y.



. . . Here's more work for your money — through effective cutting over full flute length. It's another Putnam feature that insures faster cutting, longer life. Over 1000 standard types and sizes available. See your Putnam distributor.

PUTNAM
TOOL COMPANY
2981 CHARLEVOIX AVENUE · DETROIT 7, MICHIGAN

COST-after 276 working days..



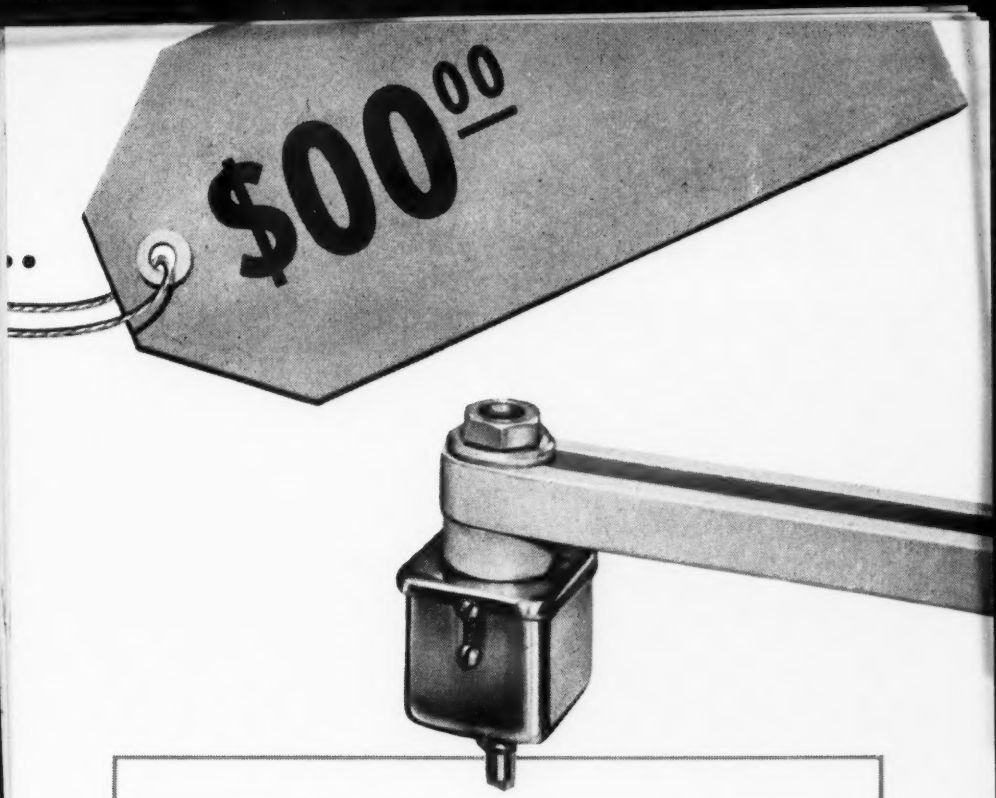
IT WROTE OFF ITS COST IN 10½ MONTHS!

This report comes from a well-known machine tool manufacturer (not us!). We can show you many similar ones from all kinds of plants. They all add up to one incontrovertible fact—Monarch Air-Gage Tracer controlled, fully automatic turning, with its single running tool, delivers output at top efficiency. Why not? Look how many ways it saves! In turning time. In setup time. In tooling time and costs. In subsequent grinding. It's true of short runs as well as long ones.

The Monarch Air-Gage Tracer is known everywhere for its superb accuracy of duplication. The swiveling type used here adds to this accuracy an amazing versatility. Apply it to our 20 x 72 Series 60 Lathe and add the Autocycle Control as above, and you have the shop man's dream come true—the ultimate in versatility *plus* fully automatic operation.

This manufacturer, after only brief experience with his Series 60, quickly added a 20 x 168 Model M Heavy Duty Lathe with similar equipment. Together, using round templates, these machines are delivering automatic output of over 600 jobs!

The Air-Gage Tracer is right! Its performance is right! Why don't *you* write—for complete information? Request Booklet #2606 and mention your specific requirements. . . . *The Monarch Machine Tool Company, Sidney, Ohio.*



HERE'S HOW!

. . . And by the user's own figures! This lathe was bought to turn 20 to 25 jobs. It proved so versatile that, with the larger Model M, it's now turning 600. Time savings vary from job to job, but here's a sample. One difficult work piece used to require 3½ hours' turning. It's turned now—in lots of 24—in 10 min. per piece. Each *lot* in only slightly more time than it used to take for each *piece!*

Monarch

ACCURACY • ECONOMY • LONG LIFE •

TURNING MACHINES

FOR A GOOD TURN FASTER . . . . . TURN TO MONARCH

4 TOOLS NOW DO THE WORK OF 18 WITH LUSOL IN THEIR MONARCH LATHES



This motor shaft is tough on tools. 18 a day were required until a 25:1 Lusol solution was put in each Monarch Lathe. Now they use only 4 tools per day for the same production and same fine finish.

Unusual? Not at all! Reports of greatly increased tool life, faster machining and better finishes are the usual thing where Lusol is at work. Plant managers tell us that, when they put Lusol in one machine, they soon have other operators asking for it. They like Lusol.



FREE BOOK

Get complete facts about Lusol by writing for this 20-page booklet. It contains information on machine cleaning, maintenance of Lusol solutions, elimination of dermatitis and odor in machines, plus many case histories of Lusol at work. Write F. E. Anderson Oil Company, 217B, Portland, Conn.



This is a special Union 4¼" four-fluted drill for core work in cast iron.

WHATEVER *YOUR* DRILLING JOB . . . large or small . . . there's a UNION twist drill that's *right* for your material and *right* for your drilling equipment. Let your Union Distributor help you choose it . . . and you'll be sure of fast, free-cutting performance, less chance of breakage and more work between resharpenings. So, put the "first team in drilling" to work for you . . . today.



FIRST TEAM IN CUTTING TOOLS . . .

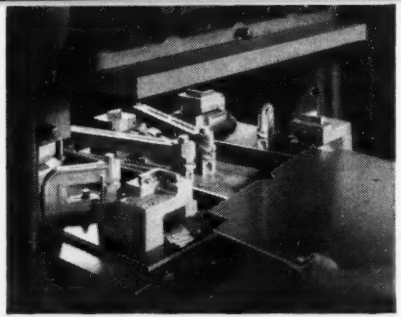
UNION *and your Local Distributor*

UNION TWIST DRILL COMPANY, ATHOL, MASSACHUSETTS • Milling Cutters • Gear Cutters • Twist Drills • Hobs • Reamers • Carbide Tools

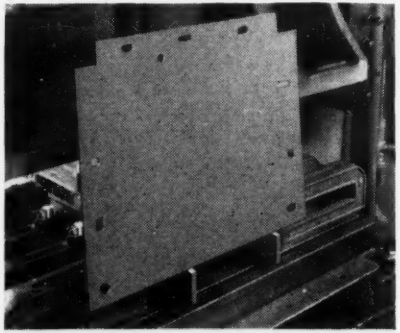
We own and operate S. W. CARD MANUFACTURING CO. Division, Mansfield, Mass., Taps, Dies, Screw Plates . . .
BUTTERFIELD DIVISION, Derby Line, Vt., Taps, Dies, Screw Plates, Reamers, Twist Drills . . .
BUTTERFIELD DIVISION, Rock Island, Que., Milling Cutters, Twist Drills, Hobs, Reamers, Taps, Dies, Screw Plates



A typical *press brake* setup of Wales Hole Punching and Notching Units.



A typical setup of Wales Hole Punching and Notching Units in a *stamping press.*



Showing typical round and shaped holes punched by Wales Hole Punching Units. Note corners have been notched by Wales Notching Units.

MAKE FASTER, MORE ECONOMICAL SETUPS IN STAMPING PRESSES AND PRESS BRAKES

. . . *By eliminating* the time consuming operation of aligning each set of punches and dies.

. . . *By eliminating* special punches, punch plates, stripper plates, die buttons and die plates.

. . . *By eliminating* "dead storage" of setups and tooling investments—Wales Units drastically reduce setup and production time plus cutting initial and operating costs.

These tooling efficiencies are made possible by the *exclusive* independent, self-contained design that holds all working parts as a single hole punching or notching unit. A group of Wales Units may be set up in unlimited patterns and in many cases, put into operation the same day a pattern is released for production.

For the complete story on this faster, more economical production technique that has revolutionized tooling practice, write TODAY for fully-illustrated, functionally-colored Catalog BL and Catalog N.

WALES-STRIPPIT CORPORATION

George F. Wales, *Chairman*

398 Payne Avenue, North Tonawanda, N. Y.

(Between Buffalo and Niagara Falls)

Wales-Strippit of Canada, Ltd., Hamilton, Ontario

Specialists in Punching and Notching Equipment

Two Beauties



Write for Descriptive Folder

Shown here is the new model "A-5" PEDRICK BENDING MACHINE. The 540 pounds one piece cast base replaces the four leg design, thus insuring rigidity. The power packed "A-5" will bend 2" standard pipe, 1 ¼" square and 1 ½" round solid bar stock, tubes, structural shapes, etc. Equipped with 5 H.P. motor gearhead drive and controls for automatic duplicate bending, the "A-5" still sells for only $1975.00 U.S. Funds, FOB factory.

PEDRICK TOOL and MACHINE CO.

3640 N. LAWRENCE ST. DEPT. 5 PHILADELPHIA 40, PA.

"ROCKWELL"* HARDNESS TESTERS

See them in Action!



J-Model "ROCKWELL" HARDNESS TESTER

at the

NATIONAL

METAL SHOW

•

Philadelphia • Oct. 20-24

•

BOOTH 706



TUKON TESTER for MICROHARDNESS TESTING

See how easy it is to be sure of the hardness of metals you process—by using WILSON Hardness Testing equipment!

*Trade Mark Reg. U.S. Pat. Off.

ACCO

WILSON

MECHANICAL INSTRUMENT DIVISION
AMERICAN CHAIN & CABLE

230-G Park Avenue, New York 17, N. Y.

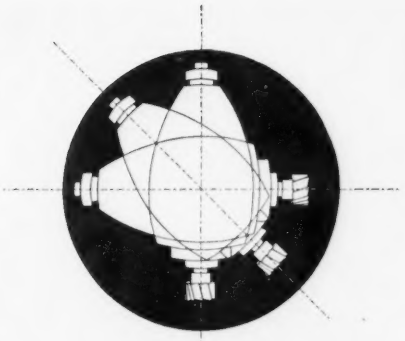
"ROCKWELL" HARDNESS TESTERS



Specifications

No. 22-L

- Table: 45" x 10"
- Cutterhead in angular position



The Adjustable Cutterhead

BROADENS THE WORK RANGE

of Van Norman Ram-Type Millers

Van Norman Ram-Type Millers mill the original setup at any angle from vertical to horizontal . . . through the full run of the table . . . without adjustments and with fewest re-setups.

Here's how it's done — operator simply swings the adjustable cutterhead from one position to the next, slides the ram in or out if need be, and goes ahead with the next cut. This extreme ease of operation and adjustment . . . applicable over an exceptionally wide range of work . . . reduces total completion time per piece, prevents errors, slashes costs. At the same time, quantity and quality of output is sharply speeded up.

And here are some more important features that cut milling costs — directional control of power-feeds . . . 6-way rapid traverse . . . large, easy-to-read dials . . . wide speed and feed selection . . . rugged construction which assures maximum rigidity.

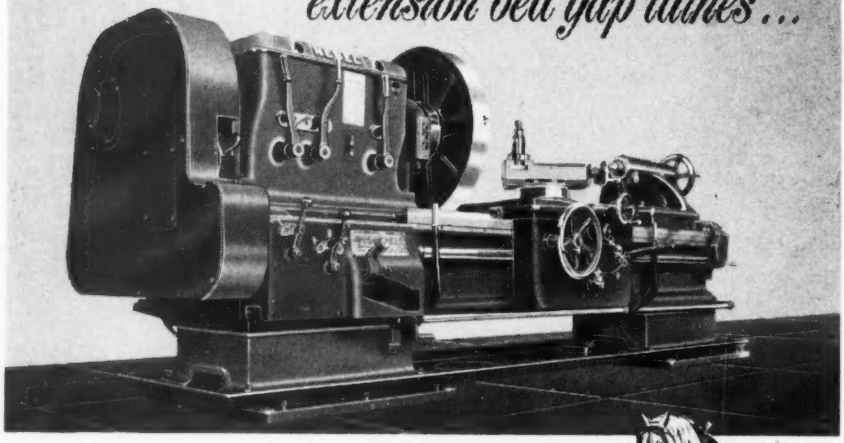
Van Norman Ram-Type milling machines will do your work faster, more easily and accurately. Six basic models available to meet every job, ranging from toolroom work to production milling. Write for catalogue.

VAN NORMAN COMPANY

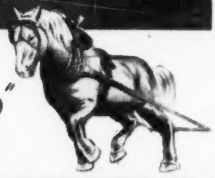
SPRINGFIELD, MASSACHUSETTS, U. S. A.

Nebel

engine, removable block gap extension bed gap lathes...



"the **Workhorse** of the jet engine shop"



FIVE OF THE COUNTRY'S LEADING jet engine producers are using Nebel lathes proudly and profitably. One Detroit jet manufacturer remarked, "we are very pleased with the lathes and are amazed that you can sell at the price you do!"

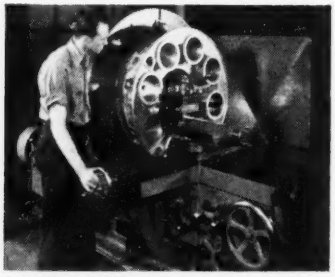
AND THAT'S REPRESENTATIVE OF the warm reception given Nebel lathes everywhere. They're basic, dependable, heavy duty lathes, built to do *big* work at *little* cost. A Nebel's a natural . . . truly the workhorse of the shop.

BUILT IN THREE MODELS: engine, removable block gap and extension bed gap . . . in swing sizes from 18" to 50". There's a size and type for your requirements, too.

Why not send for complete information today?

★ **THE NEBEL MACHINE TOOL CO., CINCINNATI 25, OHIO, U.S.A.**

Builders of fine lathes at modest cost since 1899.

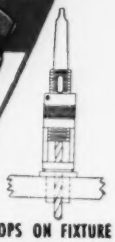


28"/50" NEBEL 'G' SERIES *extension bed gap lathe machining compressor rear frame for a jet engine.*

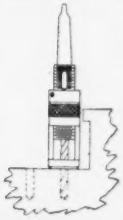
NEW DRILL STOP

...a positive control for depth of hole

by S-J SCULLY JONES



STOPS ON FIXTURE BUSHING OR WORK



End Guesswork and Reduce Rejects:

You often require close control of depth for operations — as in center drilling, drilling and reaming — on turret lathes, radial drills and other machines. On these operations, or wherever a quick change arrangement is used in one station for sequence operations, you hold uniform hole depth by using the new S-J Drill Stops. They provide a positive stop which ends guesswork and reduces rejects.



Quick and Easy to Insert, Remove and Adjust Tools:

Simply loosen set screw and slip stop collar from threaded shank for quick insertion or removal of taper shank tools. The threaded lock bushing provides quick and accurate adjustment of the stop collar. Only a quarter turn of the set screw forces the bushing against the shank threads for a positive lock.

Work on Close Centers:

The small body diameter permits you to operate these Drill Stops on close centers and near shoulders or other obstructions.

Trouble-Free Performance:

S-J Drill Stops are made from an alloy steel with all points of wear hardened for long life. The four chip grooves tend to break up and remove any chips from the surface on which it stops. Investigate the use of S-J Drill Stops wherever you require a positive control for depth of hole. Made in 8 sizes having Morse Taper shanks and holes.

Write for BULLETIN NO. 18-50 for data on Drill Stops.

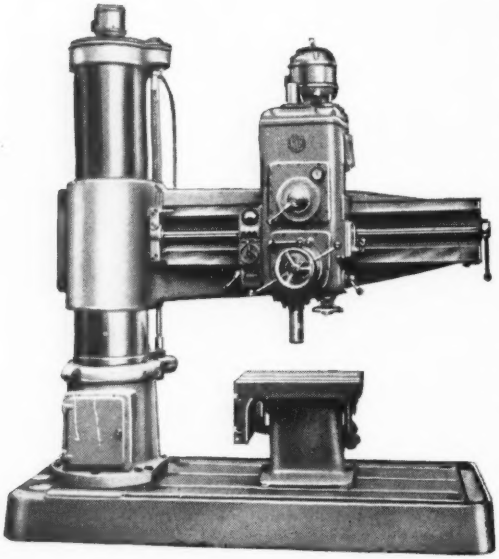
Scully-Jones AND COMPANY

1909 S. Rockwell St., Chicago 8, Ill.

R-5728MT

YOU GET LOW COST FAST ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS

KOLB RADIAL DRILLS FOR LIGHT · MEDIUM · HEAVY DUTY



Model NKR-53 Kolb Radial Drill has 12 speeds from 30 to 1500 R.P.M. and 12 feeds from .003" to .118" per rev.

FOR ACCURATE PRODUCTION

- Heavy bases, columns and arms —Rigidly constructed
- Column diameters from 7½" to 35"
- Flanged motor mounted on top of spindle head
- Hardened and ground gears
- Hardened and ground spline shafts rotating on ball bearings

FOR SPEEDIER PRODUCTION

- Selector device for pre-setting speeds and feeds
- Rigid locking of column and spindle head by electro-hydraulic clamping system (automatically or by hand)
- Push button controls
- Automatic depth release

FOR YOUR PRODUCTION

- Maximum drilling capacities in cast iron—1⅜" to 8" diameter
- Maximum drill radii—27" to 180"
- Spindle speeds—12, 24 or 36—from 30 to 3000 R.P.M.
- Feeds—6, 9, 12 or 18—from .0012" to .1181" per rev.

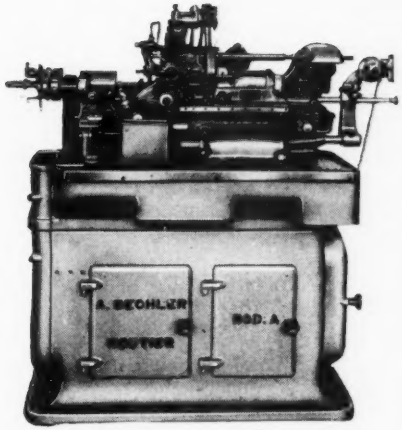
THERE IS A KOLB RADIAL FOR YOUR DRILLING JOB
LET COSA QUOTE ON YOUR SPECIFIC NEEDS

COSA CORPORATION
405 Lexington Ave., New York 17

Your source for all Precision Machine Tools—from Small Bench Lathes to Large Boring Mills

IN DETROIT AREA contact DETROIT-COSA CORPORATION, 16923 James Couzens Highway, Detroit 35, Mich.

MEET HIGH PRECISION *DEMANDS*
with
BECHLER SWISS AUTOMATICS



Model A-10 BECHLER AUTOMATIC has ⅜" diameter capacity, 2¾" turning length, 5 cross tools. This Automatic is equipped with single spindle threading attachment and slotting attachment for producing PRECISION SCREWS.

The advantages of using BECHLER AUTOMATICS to speed production:

1. Over 20 spindle speeds.
2. 88 camshaft speeds for each spindle speed selected.
3. More than 30 different attachments.
4. A new device prevents the breaking of carbide tools.
5. Easiest tool adjustments.

DIAMETER CAPACITIES

BECHLER AUTOMATICS

Model AS	5/64"	5/32"	9/32"	3/8"
Model A	—	5/32"	9/32"	3/8"
Model B	1/2"	5/8"	3/4"	—
Model C	1"	1¼"	—	—

BECHLER ISOMATICS

Automatics for constant and highly accurate production of very small parts.

Model AS	5/64"	5/32"	9/32"
Model A	—	5/32"	9/32"

OTHER BECHLER MACHINES . . . MODEL CF CAM SHAPERS • SIMPLEX AND DUPLEX PINION CUTTING MACHINES

ADDITIONAL SERVICES

- ATTACHMENTS, SPARE PARTS, CAMS available from New York Stock
- TOOLING SERVICES for planning layouts and set-ups and for making cams and tools

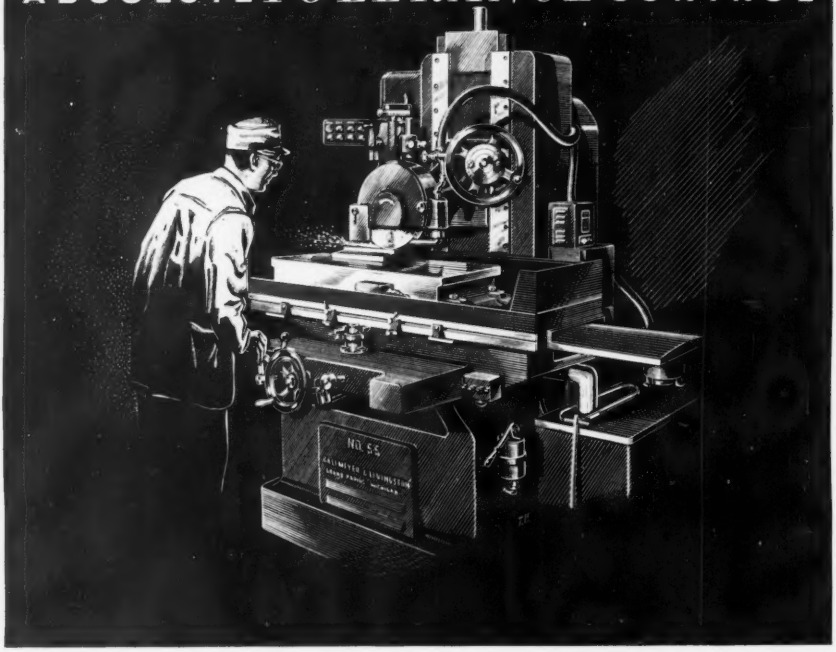
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COSA CORPORATION
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When job specifications leave no leeway, when extreme tolerances must be rigidly maintained . . . that's when the built-in precision of Grand Rapids Grinders proves most valuable.

Defense commitments make it impossible for us to fill your orders as rapidly as we'd like to...but we know our customers can appreciate the reasons for delay. As always, we're doing our best to serve you.

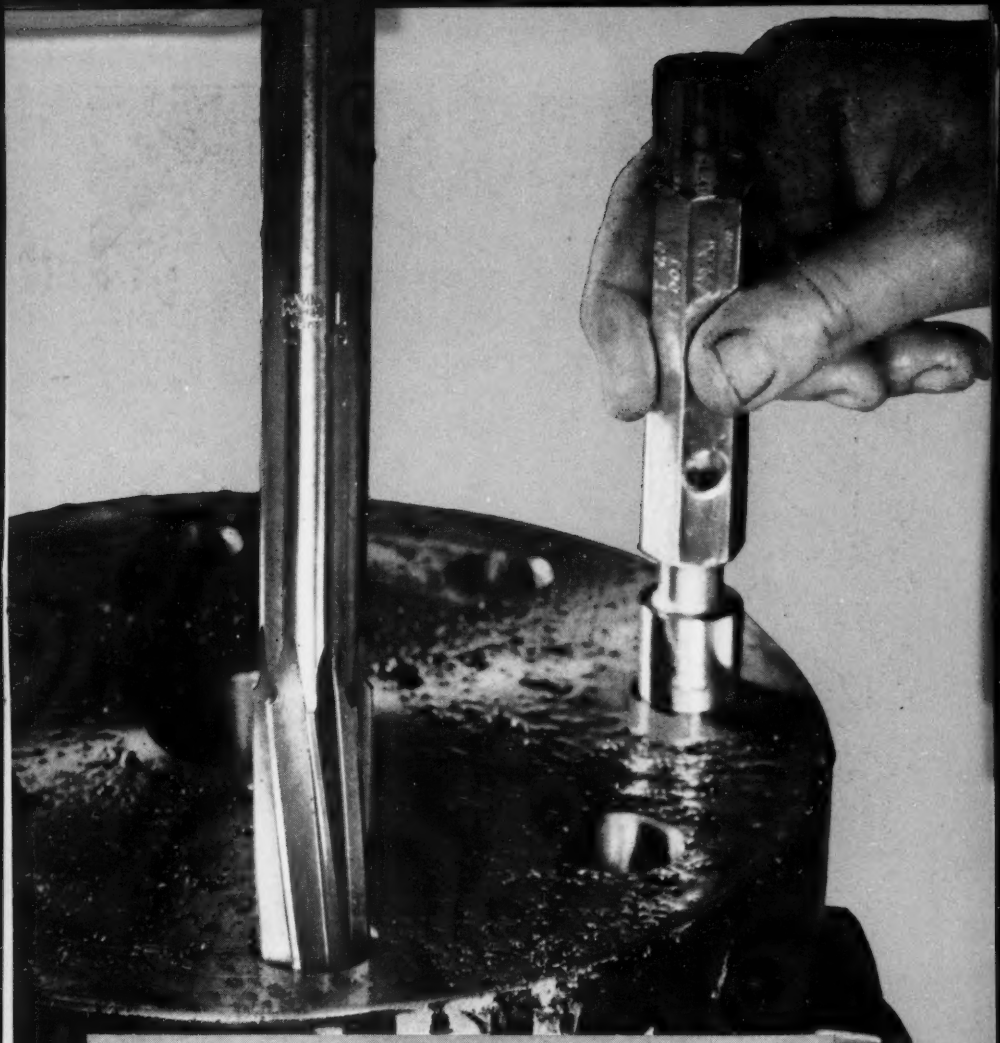
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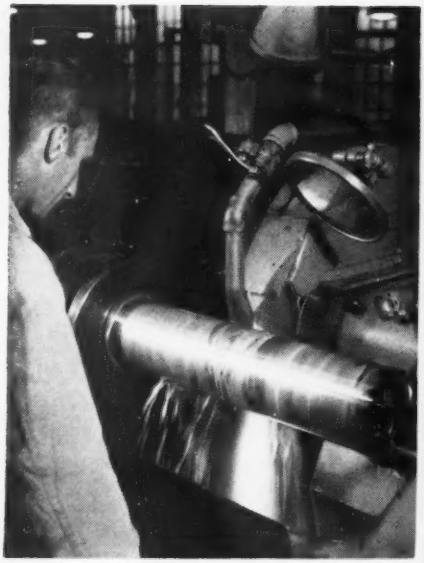
WHETHER YOU ARE REAMING FOR SIZE or finish and size; whether your reaming requirements are for a few holes or thousands, you'll find GTD AMPCO reamers up there among the best. And there is a GTD AMPCO field engineer at your service in most industrial centers. If you have reaming problems call any Greenfield sales office.

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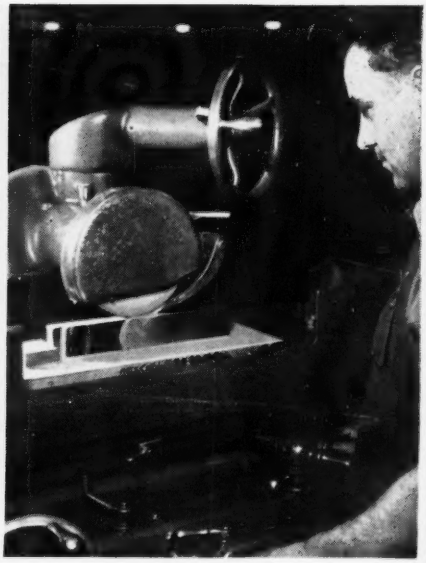
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O.D. GRINDING. You can get Norton O.D. wheels in the abrasives, grain sizes and bonds for best results on every material. They're sure protection for your big investment in O.D. grinding machines.



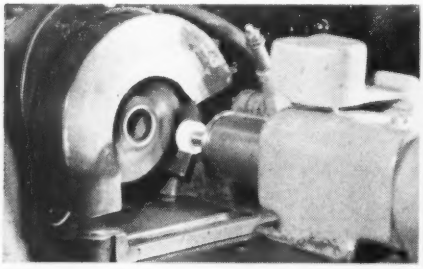
SURFACE GRINDING. You'll find Norton wheels, cylinders, segments and discs unbeatable for fast, cool cutting action. Use 32 and 38 ALUNDUM abrasive on all hardened steels and CRYSTOLON abrasive on gray iron and non-ferrous metals.

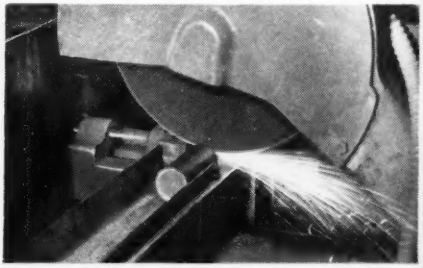
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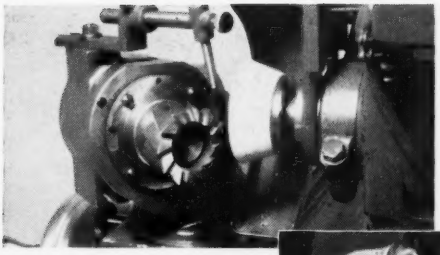
More types of abrasive products...for More

INTERNAL GRINDING. Being identical in grinding action, Norton *Neat-Process* wheels can be changed without machine adjustments. That and uniform top performance make them valuable production boosters.

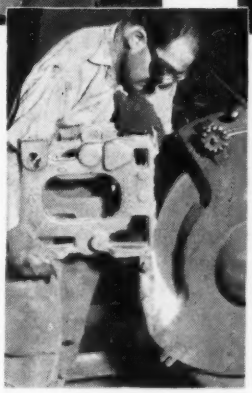
CUTTING-OFF. For wet or dry applications, high or low speeds, on any material, there's a Norton wheel in ALUNDUM or CRYSTOLON abrasive that's "made to order" for fast, economical cutting-off.



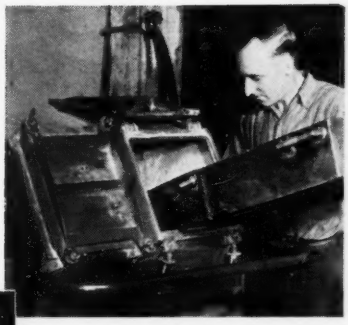




TOOL AND CUTTER GRINDING. Norton *New-Process* wheels bring you unequalled uniformity, identical wheel performance and longer, more even wheel wear. Use 32 ALUNDUM* abrasive on carbon and alloy steels, CRYSTOLON* abrasive on cemented carbides.



ROUGH GRINDING. On your swing frames, floor stands or portable grinders, Norton wheels "hug that work," to cut time and costs. And Norton *Reinforced Hub* Wheels are the safest, most versatile ever made.



BARREL-FINISHING. ALUNDUM tumbling abrasive, being *all* aluminum oxide, cuts without glazing, has the hardness and toughness to stand repeated use. It's the abrasive that assures real precision-finishing.



POLISHING AND LAPPING. ALUNDUM grain comes in surface treatments and grain sizes for best results on every polishing job you do. And precise sizing makes ALUNDUM and CRYSTOLON abrasives favorites for even the fussiest lapping jobs.

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The Norton line of abrasive products offers you more choices than any other. And Norton Research makes sure that every Norton abrasive product will deliver top performance on the work it is designed for.

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He knows Norton abrasive products — and you'll find that his aid in selecting the right ones for *your* jobs is a real short cut to better, lower cost grinding . . . NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

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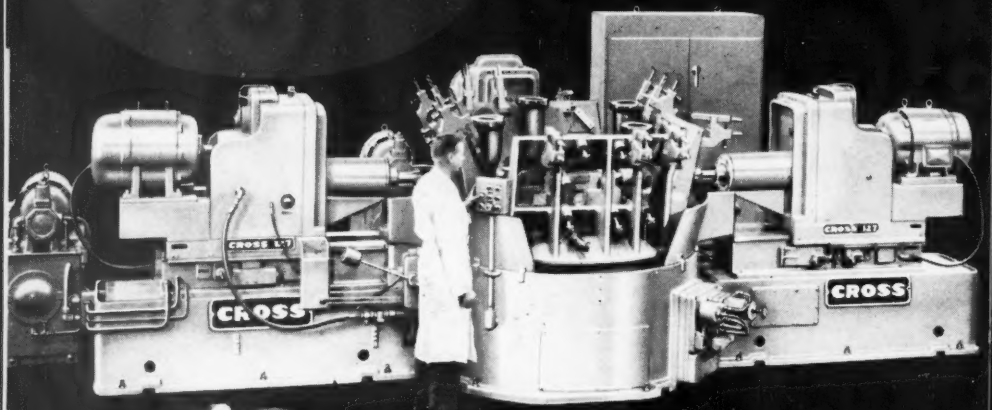
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- ★ JIC standard hydraulic and electrical construction with stranded wire.
- ★ Other features: hardened and ground ways, hydraulic feed and rapid traverse, pre-set tools, automatic gravity operated cam clamping for the index table.

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October 16-17

Gray Iron Founders' Society 24th Annual Meeting and Convention, Hotel Cleveland, Cleveland, Ohio.

October 18-24

National Metal Congress and Exposition, Philadelphia Convention Hall, Philadelphia, Pennsylvania. See Page 192 of this issue.

October 20-24

Fortieth National Safety Congress and Exposition at Hotels Conrad Hilton, Congress, Morrison and Sheraton, Chicago, Illinois.

October 26-29

American Gear Manufacturers Association Semi-Annual Meeting, Edgewater Beach Hotel, Chicago, Illinois.

October 28-29

Westinghouse Fourth Annual Materials Handling Conference, Hotel Statler, Buffalo, New York.

October 29-31

Fifth Annual American Institute of Electrical Engineers Machine Tool Conference, Hotel Ten Eyck, Albany, New York.

December 3-5

Society for Experimental Stress Analysis Annual Meeting and Exhibition, Hotel McAlpin, New York, New York.

January 19-22

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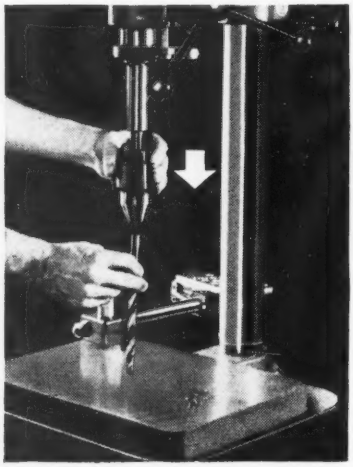
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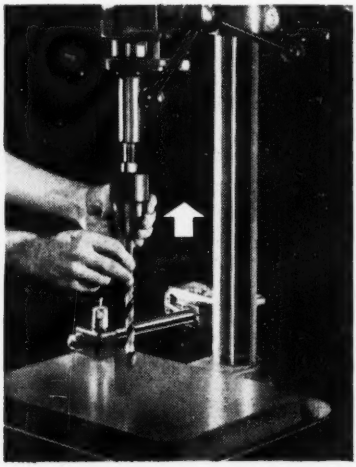
CHICOPEE, MASS.

Change tools *in seconds* with this FULLY-AUTOMATIC CHUCK

no keys . . . collets . . . or wrenches



SPINDLE NEVER STOPS



HERE'S ALL THERE IS TO CHANGING TOOLS

TO OPEN – Grip Sleeve – pull down – jaws open automatically – tool is released.

TO CLOSE – Insert new tool – push up tapered part – tool is locked in place.

SAVE TIME—Change tools with spindle running . . . no keys, collets or wrenches needed. Ideal for fast, uninterrupted production.

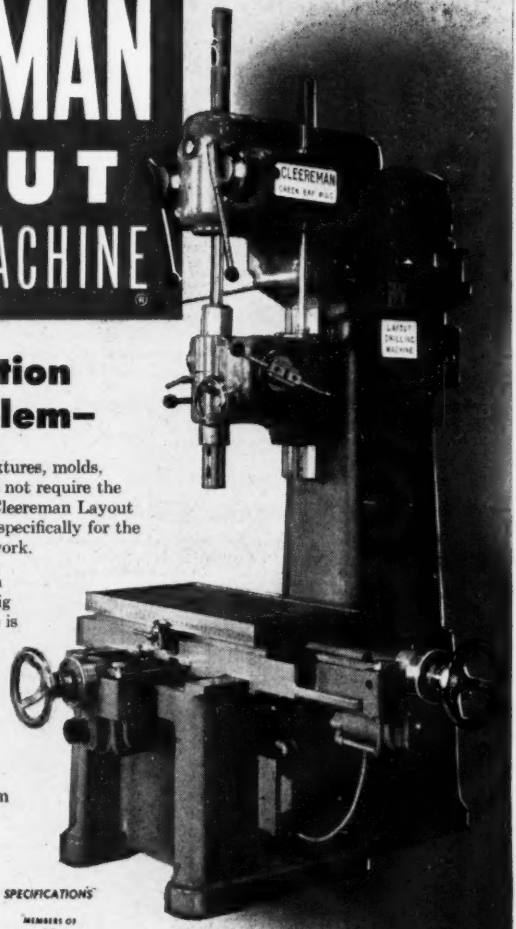
SAVE MONEY—One spindle does the work of several. Smooth, hardened and ground jaws grip tight without chewing tools.

IDEAL FOR—Precision drilling or for spotting, drilling and reaming in boring or milling machines; in lathe work for burring, turning and filing.

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WAHLSTROM®
CHUCKS AND TAPPING ATTACHMENTS
FULLY-AUTOMATIC

CLEEREMAN
LAYOUT
DRILLING MACHINE



A Modern solution to an Old Problem–

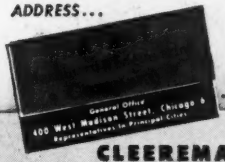
A large portion of tools, dies, jigs, fixtures, molds, jig-less production and other jobs do not require the ultra-precision of a Jig Borer. The Cleereman Layout Drilling Machine has been designed specifically for the efficient handling of this particular work.

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CLEEREMAN MACHINE TOOL CO. Green Bay, Wisconsin

BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES

Sure Spec Drill Rod

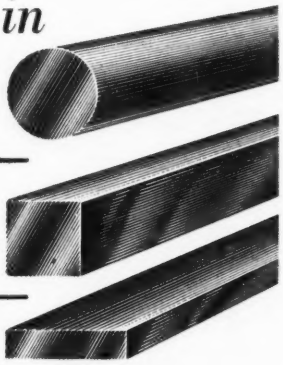
Finest Quality in

Sure Spec Drill Rod is high grade tool steel . . . comes in manufacturer's standard sizes at low prices!

ROUNDS from .013 to 2"

SQUARES from 1/16" to 1"

FLATS from 1/16" x 1/8" to 1/2" x 1"



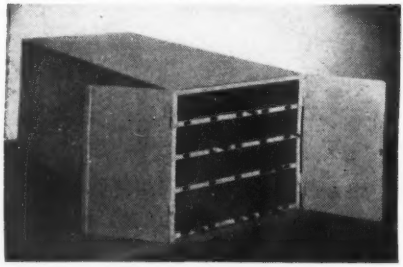
See! *this easy purchase plan . . .*

One of these safe, sturdy steel compartments designed to protect your drill rod, is yours on this easy plan:

1. **You may get the cabinet or the floor rack free with an initial order of $150 of Sure Spec drill rod.**
2. **Or you may get a $24.95 credit for the cabinet or a $15 credit for the floor rack if your initial purchase of $150 worth of Sure Spec Drill rod is within a 90-day period.**

Send your order for plan 1 or 2 today

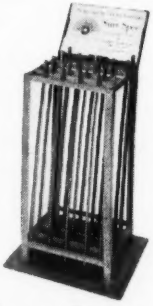
WRITE TODAY to our nearest office shown below for a *comprehensive data* book detailing all the facts about Sure Spec drill rod, such as sizes, analysis, uses and treating. Also, at your request, one of our sales engineers will call to discuss your particular drill rod requirements and quote prices.



With these safe, sturdy compartments to store and protect it!

Cabinet is all steel. Painted orange and black. Stocks 3-foot lengths. Has 20 separate bins.

Floor rack is all steel with composite floor mat to protect ends. Painted orange and black. 20 separate compartments. Stocks 3 foot and longer lengths.



"for service dependable as the sun"

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SURE SPEC

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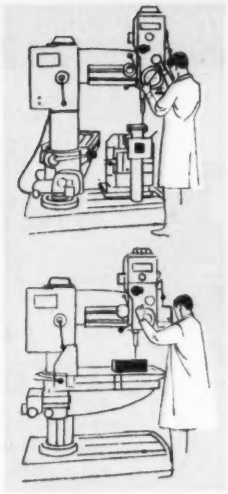
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DRILL AND TAP

ON BASE OR TABLE

with Fosdick's Sensitive Radial



Think of it! With a *single* machine you can drill and tap small parts on the table — large parts on the base.

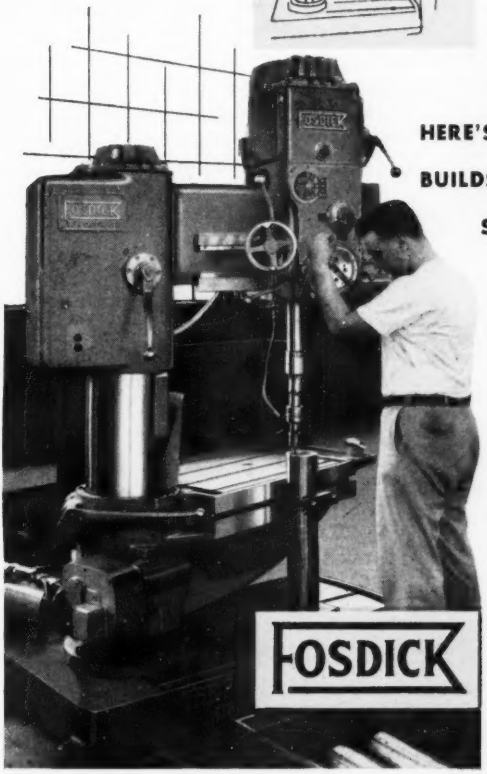
Drill holes up to 1¼". Tap with Fosdick's special Automatic Tapping Control* that saves time by returning the spindle to forward rotation the instant the tap clears the work.

Imagine the convenience of the fixed-height arm that swings 360° — controls are always handy. And the table adjusts to exactly the right height for your work, or swings out of the way. No other drill gives you this versatility and convenience.

Can't *your* shop benefit from the volume and variety of work this combined sensitive and radial can produce? And so economically!

Get the facts from your nearby Fosdick Distributor. If this isn't convenient, write us today for Bulletin SRS.

* Available as extra equipment.



HERE'S HOW *Lodge and Shipley* BUILDS LATHES WITH THE HELP OF SENSITIVE RADIAL VERSATILITY

Clamped to the vee on the table is a tailstock spindle. Operation: drill, chamfer and tap 4 holes. 17/64" drill, 1020 rpm, .004 ipr, ⅞" deep. Chamfer, 1020 rpm. Tap 5/16" x 18 thread using Automatic Tapping Control, 240 rpm, ½" deep. And Lodge & Shipley uses their Sensitive Radial for a variety of other work including steel tool blocks, levers and multiple-drilled cam plates.

THE FOSDICK MACHINE TOOL CO.,
CINCINNATI 23, OHIO

RADIAL DRILLS — SENSITIVE AND UPRIGHT DRILLS

JIG BORERS — AUTOMATIC POSITIONING MACHINES

SENSITIVE RADIAL DRILLS

Practically a complete grinding department in itself!



HAHN and KOLB WSRO UNIVERSAL TOOL and CUTTER GRINDER

Here's the most useful machine your grinding department can have . . . It does all the required work—and does it with precision, accuracy, speed and safety! With extra equipment it can be used as a tool grinder, a cutter grinder, cylindrical, internal and surface grinder . . . as well as for grinding twist drills, radial grinding and relief work at any angle setting within 360°

Built in Germany to American specifications and measurements, the WSRO is sturdily constructed to give complete satisfaction wherever it is used. *Tooling interchangeable with American machine tools.*

Write today for illustrated folder giving full specifications

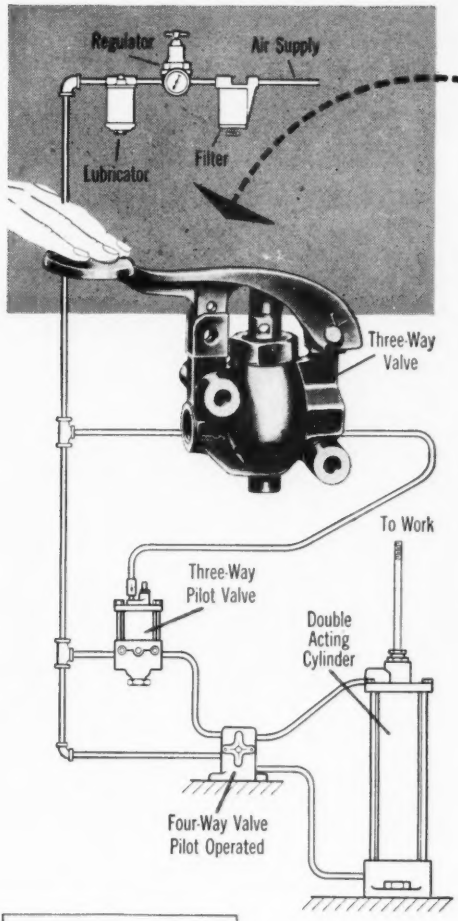
PARTIAL LIST OF SPECIFICATIONS

Long. movement of the table	16″
Cross movement of the table	10″
Cylindrical grinding length	8-4/5″
Maximum swing over table	10″
Maximum grinding wheel	7″
Spindle speeds	3000 to 6000
Motor	1 HP

PROMPT DELIVERY • NO PRIORITIES REQUIRED

MOREY *...for machine tools!*

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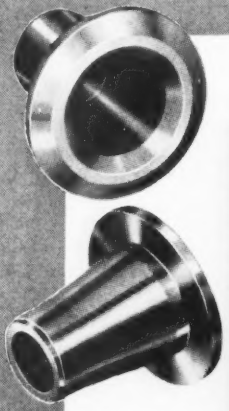
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Name_____ Title_____

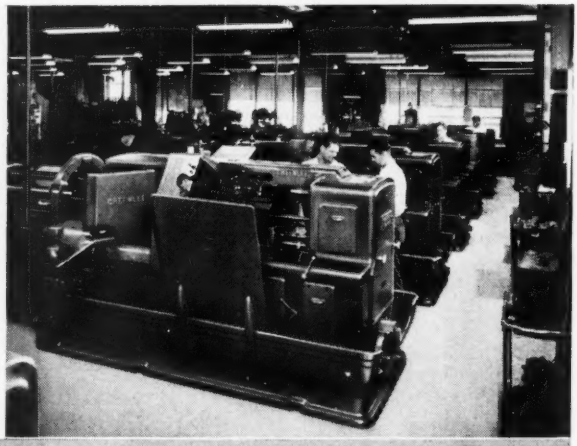
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QUICK JOB CHANGES WITH GREENLEE automatics



Injector plunger part machined on a 2-inch Greenlee Six from C-1117 bar stock in 59 seconds, to tolerances of 0.002". Former machining time was 3 to 4 minutes per piece on single-spindle equipment.



...INCREASE PROFITS FOR MITCHEL AND SCOTT

The quick change-over features of Greenlee Automatics . . . standardized, interchangeable tool holders, simplified cross-slide camming, rapid stroke-setting arrangement, built-in threading drive, and other important characteristics make them equally adaptable for short or long-run applications.

The Mitchel and Scott Machine Company, Inc., of Indianapolis, Indiana, operate seven Greenlees . . . using them in producing a wide variety of job-shop work. Some of the jobs, such as the one illustrated, run as few as 2000 pieces . . . so set-up time must be reduced substantially to make them show a satisfactory profit.

GREENLEE

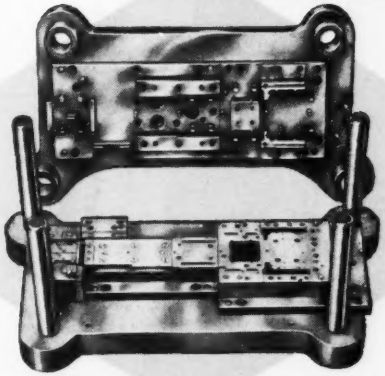
★ If your production schedules are cramped by long, costly set-ups, we'll be glad to make recommendations.

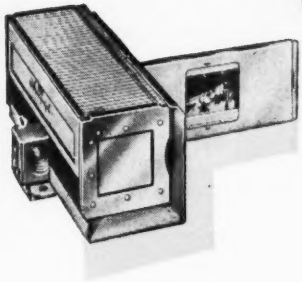
GREENLEE BROS. & CO. 1890 MASON AVE. ROCKFORD, ILLINOIS

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

200 frames a minute.

on PRODUCTO DIE SET





PERFORMANCE

12,000 pieces produced per hour
Over 2 million pieces produced between grinds
Continuous operation for 20 months

EQUIPMENT

Die: six-station (piercing, forming, cut-off)
Die Set: Producto special four-pin
Feed: special high-speed automatic

SPECIFICATIONS

Frame Size: 2.157 inches by 2.020 inches
Tolerances: plus .000 inch minus .005 inch
Material: .010 inch thick 52 S-H38 aluminum

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Cleveland 14 — 3200 Lakeside Avenue
Dayton 7 — 3632 Delphos Avenue
Chicago 44 — Federal Machinery Sales Co.
Los Angeles 21 — Jamison Steel Corp.
San Francisco 7 — Jamison Steel Corp.

It is no secret that the ease of operation of the slide changer, illustrated above, is due to the precise stamping of the frames. To obtain consistently accurate frames, the Airequipt Mfg. Co., New Rochelle, N. Y., selected a Producto die set to mount their die. Result — practically no rejects, and an amazing production rate of 200 frames per minute!

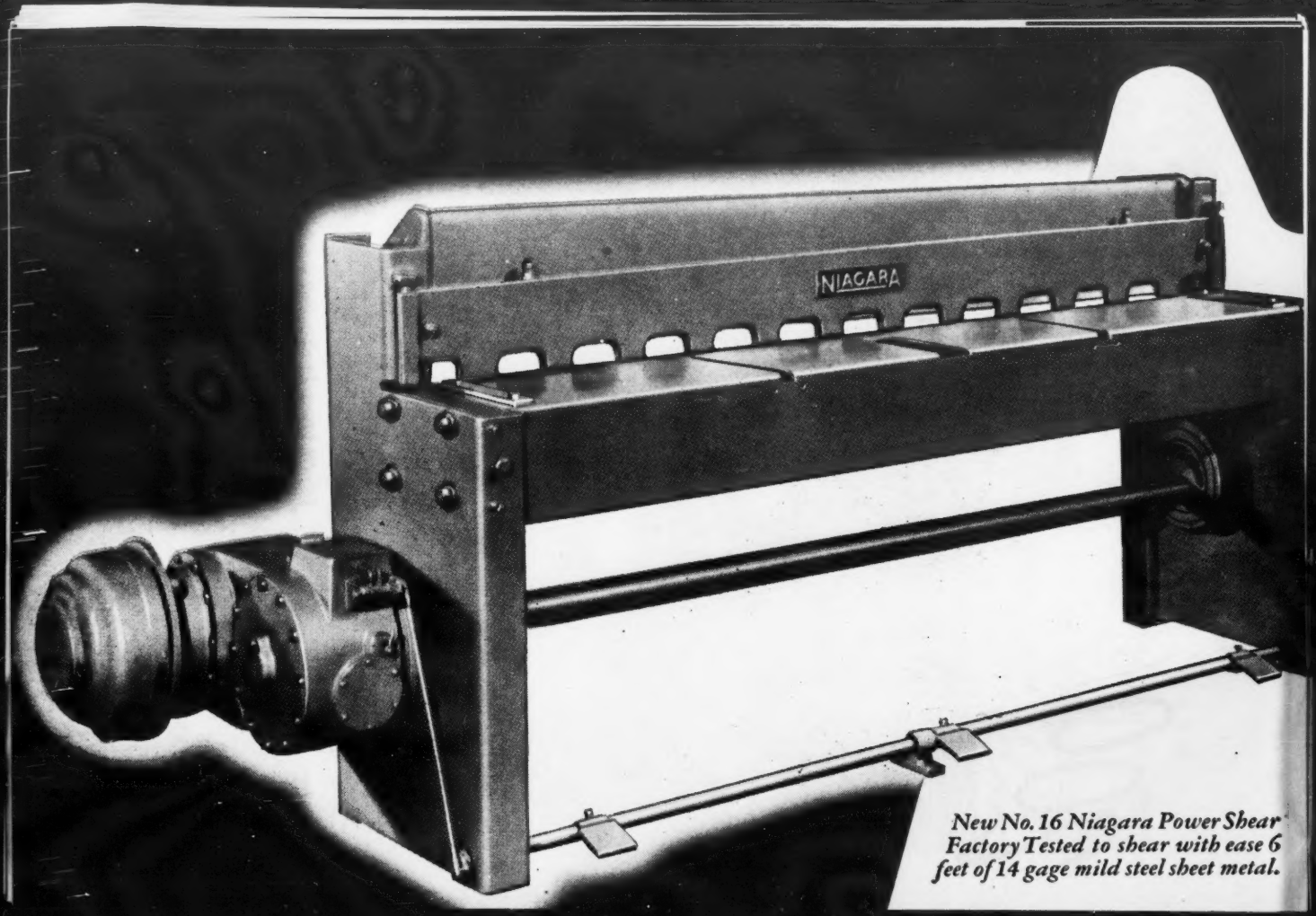
Call your nearest Producto branch . . . they have the answer to greater stamping accuracy and higher production.

THE PRODUCTO MACHINE COMPANY
910 Housatonic Ave., Bridgeport 1, Conn.

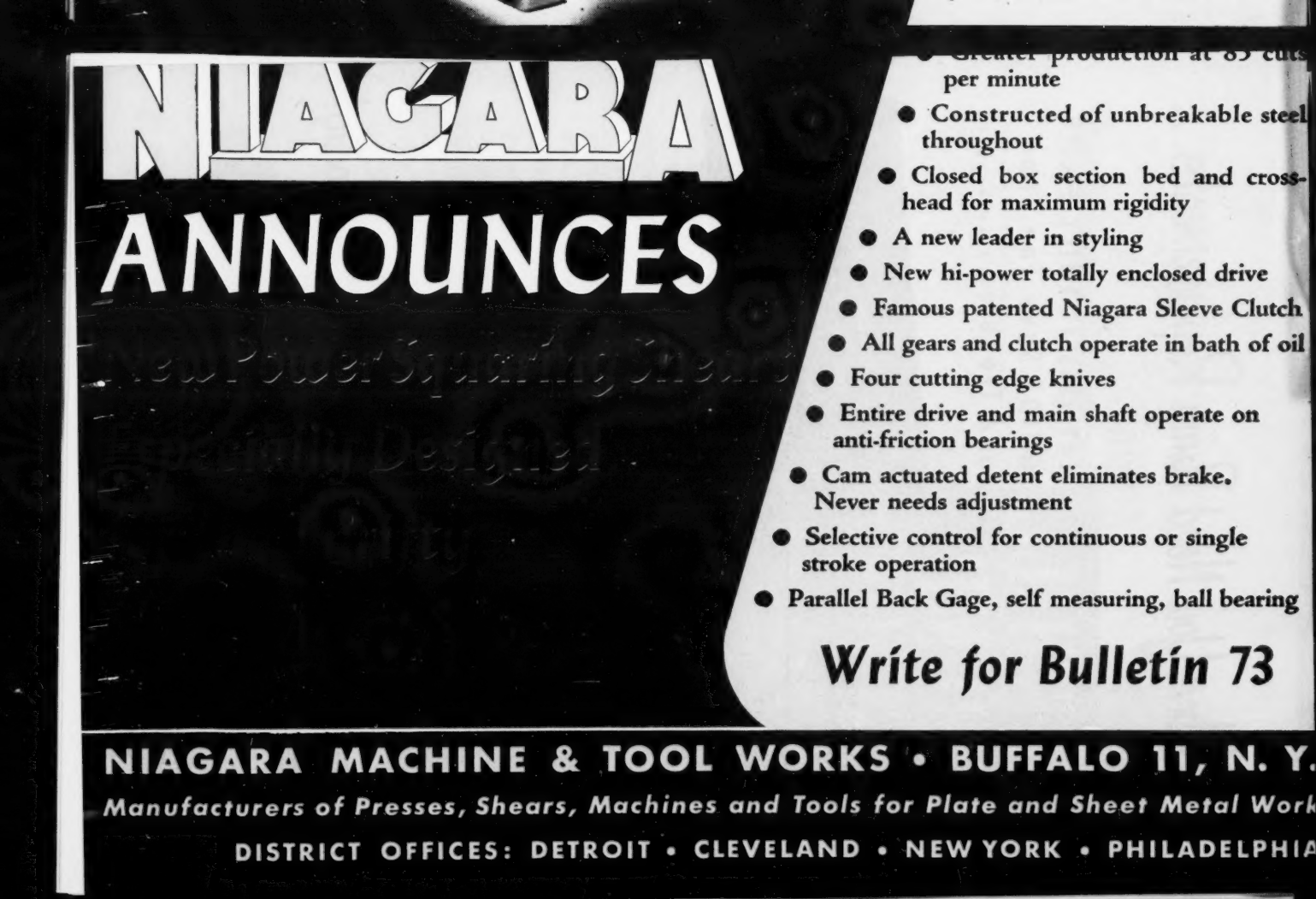
FOR PRECISION DIE SETS . . . FAST . . . CALL . . . PRODUCTO

ALSO MAKERS OF DIE ACCESSORIES, FEEDING EQUIPMENT, VISES, MACHINERY.

4PD52



New No. 16 Niagara Power Shear Factory Tested to shear with ease 6 feet of 14 gage mild steel sheet metal.



- Greater production at 85 cuts per minute
- Constructed of unbreakable steel throughout
- Closed box section bed and cross-head for maximum rigidity
- A new leader in styling
- New hi-power totally enclosed drive
- Famous patented Niagara Sleeve Clutch
- All gears and clutch operate in bath of oil
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- Cam actuated detent eliminates brake. Never needs adjustment
- Selective control for continuous or single stroke operation
- Parallel Back Gage, self measuring, ball bearing

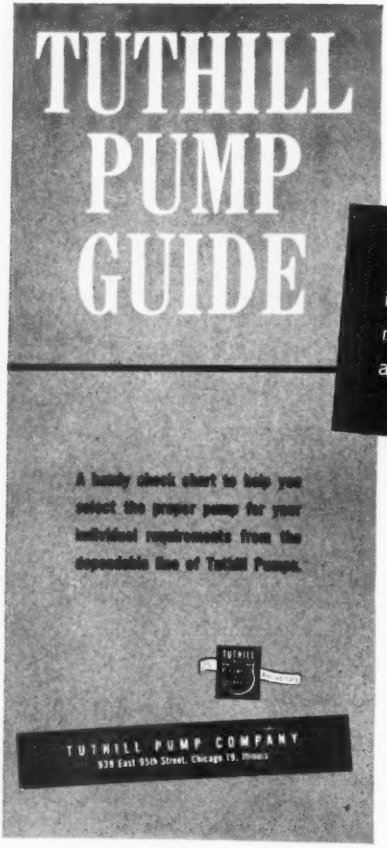
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NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

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SAVE WEEKS OF VALUABLE TIME!
It's easy to SHARPEN all types and sizes of BROACHES with this

VERSATILE LAPOINTE

UNIVERSAL BROACH SHARPENER



Built with simplified "Touch-Controls", it practically eliminates all need for skill in sharpening broaches. Any reasonably good tool man can do an expert job in no time at all!

We design and build a complete line of standard and special broaching machines, tools and fixtures.

Available in 3 SIZES: 60", 72" and 80", the LAPOINTE Universal BROACH SHARPENER occupies a surprisingly small floor area and will soon pay for itself *in time saved and money earned.* Attachments are available for backing-off.

Ask us about the NEW 36" LAPOINTE Broach Sharpener designed especially for surface broaches. This sharpener has no head and tail stock, but uses a vise only. "Touch-Control" enables the operator to remove a minimum of stock, thus prolonging the life of the tool.



Every plant that owns a broaching machine needs the LAPOINTE Manual on Broach Sharpening.

Ask for Booklet BSM 8

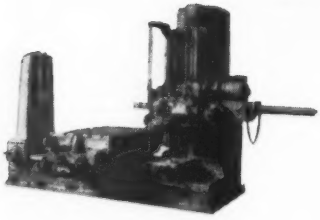
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We're the oldest in the world
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Branch Factory: Watford, Herts., England

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES



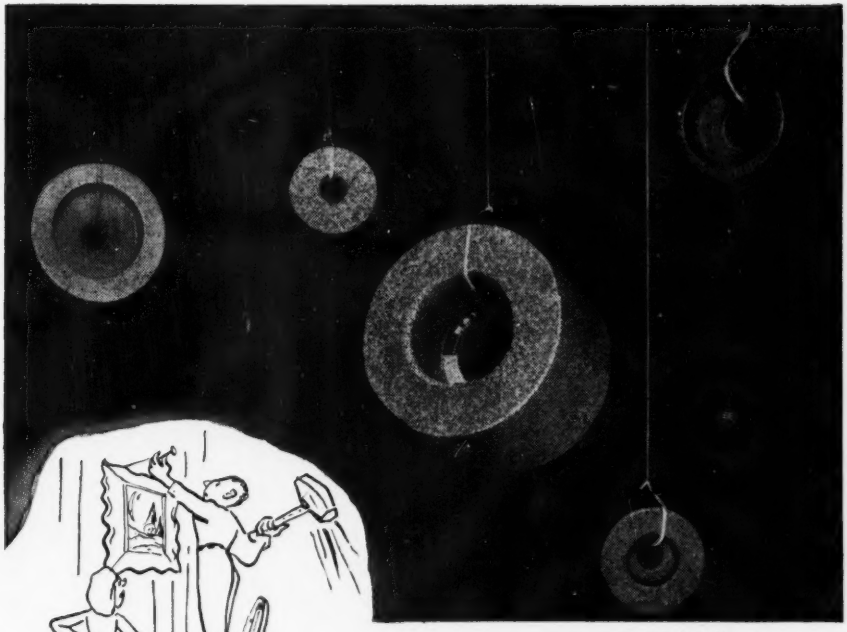
boring mill life and accuracy



THE CINCINNATI
GILBERT
MACHINE TOOL COMPANY
3366 BEEKMAN STREET • CINCINNATI 23, OHIO

Cincinnati Gilbert boring mill columns ride on non-metallic way blocks that virtually eliminate scoring, sticking, or wear on the bed ways! The non-metallic material contains thousands of oil-bearing fibers *at right angles to the face of the blocks* which maintain effective lubrication even under the most severe conditions. The records prove it. Gilbert accuracy is also sustained by the use of narrow guides throughout. The head has plenty of heft and a minimum of moving elements in the transmission . . . On your next horizontal boring mill purchase, *aim high on performance:* specify Cincinnati Gilbert, equipped with Gilbert non-metallic way blocks.

those who buy Gilbert buy Gilbert again



YOU COULD HANG PICTURES with a sledge hammer...

but . . . you shouldn't — nor should you use just any internal grinding wheel when you can use Bay State's . . . proven best in the field for the countless inside grinding jobs that call for speed and accuracy.

Deservedly popular, Bay State Internal Grinding Wheels are:

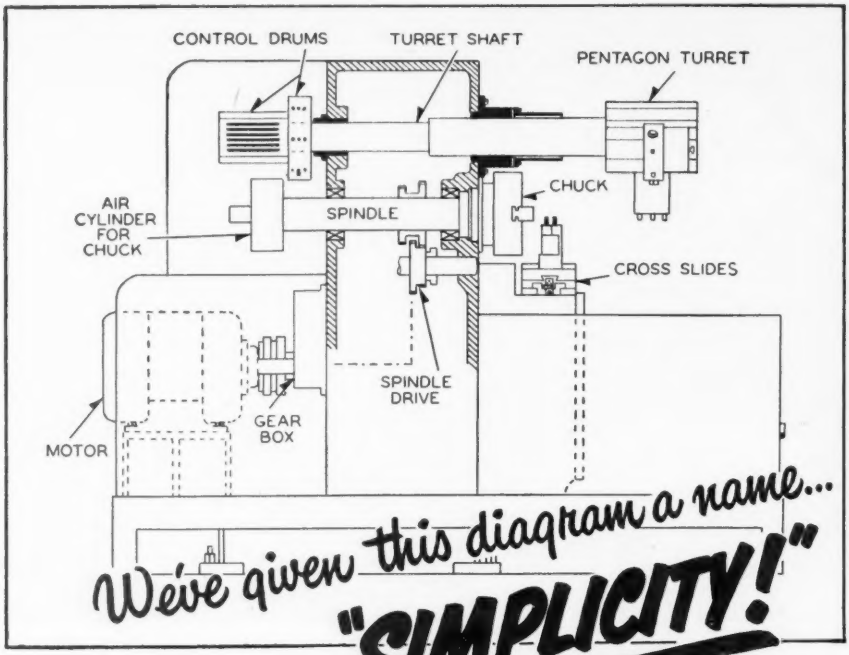
- **UNIFORM** — due to exacting standards of manufacture
- **TRUE-RUNNING** — because of accurate centering
- **LONG-LASTING** — because they fit-the-job, through the proper selection of grit and grade. (That's where Bay State engineering experts will really help you.)

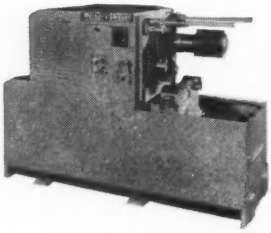
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BAY STATE ABRASIVE PRODUCTS CO.
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Branch Offices and Warehouses —
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In Canada: Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ontario

BAY STATE'S current expansion program includes a new 250 foot kiln plus a 30% increase in plant capacity . . . this means better deliveries to you.





WARNER & SWASEY *Cleveland*

WE'VE LABELED IT "simplicity" because the machine it represents *is* so simple. Engineered simplicity is designed into the Warner & Swasey 1-AC Single Spindle Automatic Chucking Machine.

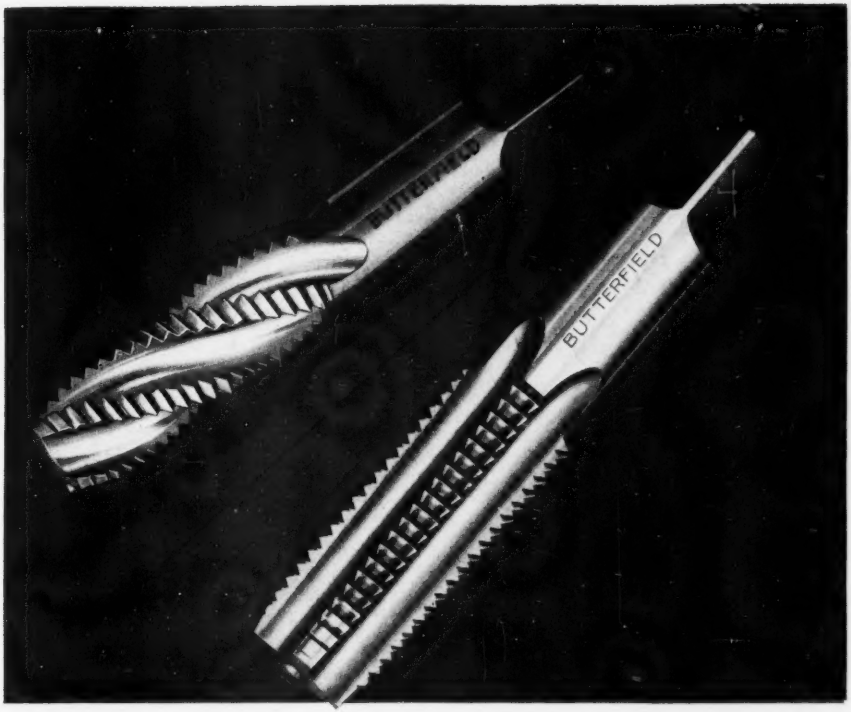
The 1-AC is simple and easy to set up . . . simple to tool, and simple to operate. There are no cams to change, and tooling stations are easy to get at. A wide range of speeds and feeds are readily available.

You get accurate, automatic machine operation on even small lot jobs that were never practical for automatic machines before.

One man can operate two machines, turning out substantially more production than two men on hand operated machines . . . and with a large saving in setup time.

Certain machining jobs in your plant—even in small or medium lot runs—can undoubtedly be done faster, and with less manpower, with the 1-AC Automatic. To find out how this 1-AC fits into your production picture, call our Field Representative in your territory.

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY TURRET LATHES, AUTOMATICS AND TAPPING MACHINES



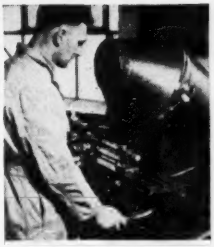
THEY BRING ASSURED ACCURACY TO YOUR TAPPING JOBS

With Butterfield Taps you eliminate all risk of getting a defective tap that has been overlooked in ordinary factory spot-checking.

Each Butterfield Tap is individually inspected to make sure it will do a fast, clean, trouble-free job of threading.

That's why continued use of these 100% inspected tools is a long range policy that pays off in smoother, more economical production.

In the complete Butterfield line there's a tap for best results in every tapping application, in every material. Union Twist Drill Company, BUTTERFIELD DIVISION, Derby Line, Vermont. *In Canada:* Rock Island, Quebec.



INSPECTOR checks thread form and lead on a Hartness Comparator that magnifies 62½ diameters. Part of Butterfield's 100% inspection.

Hand Taps • Machine Screw Taps • Pipe Taps
Stove Bolt Taps • Pulley Taps
Staybolt Taps • Boiler Taps • Nut Taps
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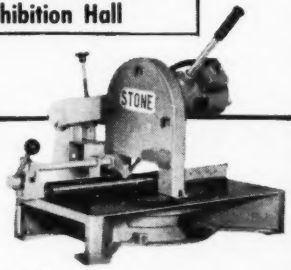
SEE YOUR NEARBY BUTTERFIELD DISTRIBUTOR FOR PROMPT DELIVERIES AND SERVICE

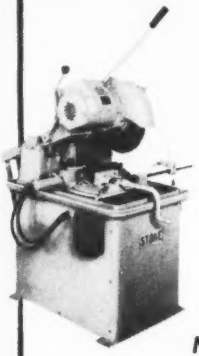
BUTTERFIELD
THE 100% INSPECTED TOOLS
Every Tool Individually Inspected
TAPS • DIES • REAMERS • SCREW PLATES

We'll Be Demonstrating at the NATIONAL METAL CONGRESS



Booth No. 551
Exhibition Hall



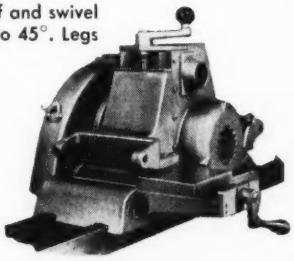


MODEL M14

32" x 34" Bench Model. This mighty little brute, with full 3½ h.p. geared-in-head motor engineered with positive drive, will cut all ferrous and non-ferrous solids up to 2" — pipe and structurals up to 2½". Two models — straight cut-off and swivel head for angle cutting to 45°. Legs available.

MODEL M75

A floor model, 2½' x 4' equipped with full 7½ h.p. geared-in-head motor engineered with positive drive, will cut all ferrous and non-ferrous solids up to 2½"— pipe and structurals up to 4". Can be furnished equipped for wet cutting.



MODEL SS20

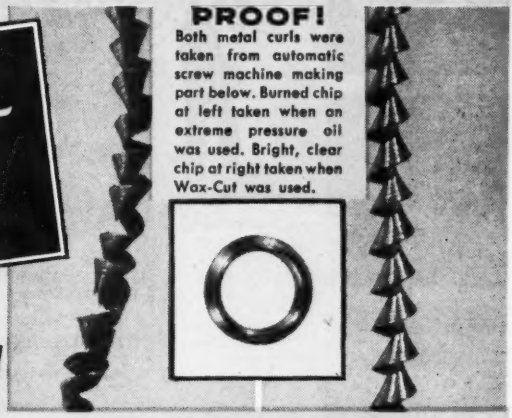
Operates on guided rails for cutting larger structural steel, plate, sheet, with cuts up to 10 feet in length. Cuts wet or dry.

For complete information write to

STONE MACHINERY CO., INC.
Fayette St. Manlius, N. Y.

FAR GREATER LUBRICITY!

JOHNSON'S®
WAX-CUT



PROOF!
Both metal curls were taken from automatic screw machine making part below. Burned chip at left taken when an extreme pressure oil was used. Bright, clear chip at right taken when Wax-Cut was used.

THE NEW WAX-TYPE CUTTING OIL

Johnson's No. 120 Wax-Cut is a new *wax* cutting fluid that has *proved* its many benefits over sulphurized and chlorinated oils. On automatic screw machines, gear cutting machines, and other machine tools requiring an oil-type cutting fluid, Wax-Cut has overwhelmingly demonstrated: greatly increased tool life . . . better cutting performance . . . *none* of the objectionable qualities of extreme pressure oils.

Months of exhaustive testing at the University of Michigan and in nationally known production shops have proved these benefits over E.P. oils:

- **Far longer tool life**
- **Increased feeds, speeds . . . improved finish**
- **Less smoking, burning, atomization**
- **Non-corrosive—won't stain metals, attack machine parts**
- **Lower viscosity minimizes "carry-off"**
- **Far cleaner . . . odorless**

A product of
JOHNSON'S WAX
Research



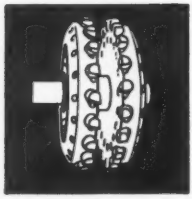
Test Wax-Cut for economy

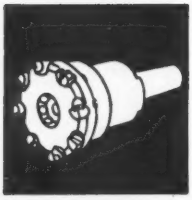
A test in your own shop will prove longer tool life . . . less down time . . . uninterrupted production—adding up to far lower operating costs.

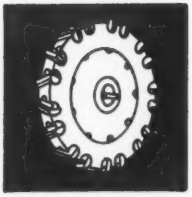
Send today for complete information:

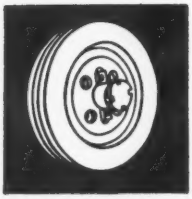
Industrial Products Dept. MMS-(10)
S. C. Johnson & Son, Inc.
Racine, Wisconsin













...the word from the wise in milling cutter circles

The modern Lovejoy line of inserted-tooth milling cutters are ordered and reordered on the basis of performance. Proof? . . . our first customers are still with us after 30 years of satisfaction.

The modern Lovejoy line has never been more complete. Improved new designs, both standard and special, are coming constantly from our large engineering staff.

The modern Lovejoy line features the exclusive "positive-locking" device to allow maximum use of each blade and minimum loss in sharpening.

The modern Lovejoy line of milling cutters, boring tools, arbors, flywheels, etc., plus outstanding field service, can help *you* cut your production costs, just as it has for others.

130 MAIN ST., SPRINGFIELD, VERMONT

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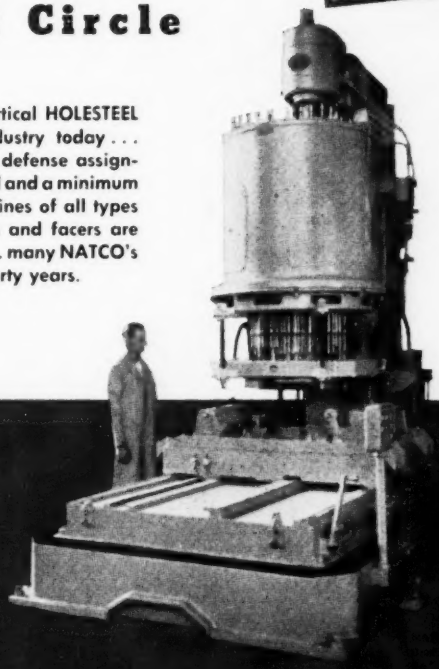
LOVEJOY TOOL COMPANY, INC.

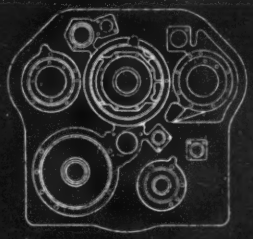
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Drilling 50 Holes on 36" Bolt Circle

Natco Engineered for Quality Production

NATCO Model C4B Vertical HOLESTEEL drillers are at work for industry today . . . doing tough peacetime and defense assignments with a maximum speed and a minimum of down time. NATCO machines of all types . . . drillers, borers, tappers and facers are veterans of years of service . . . many NATCO's are now in operation over forty years.





THIS TANK TRANSMISSION PART FOR EXAMPLE:

50 holes in this gear case are combination 2 diameter drilling, counterboring . . . 30 parts per hour . . . day in and day out . . . typical example of NATCO economical production.



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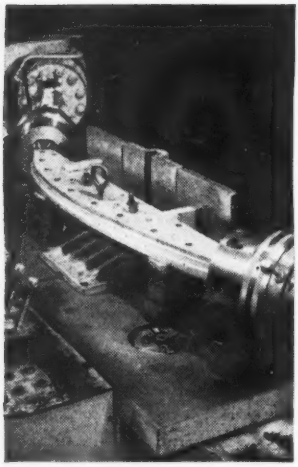
to help you solve your problems in Drilling, Tapping, Boring and Facing

NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana

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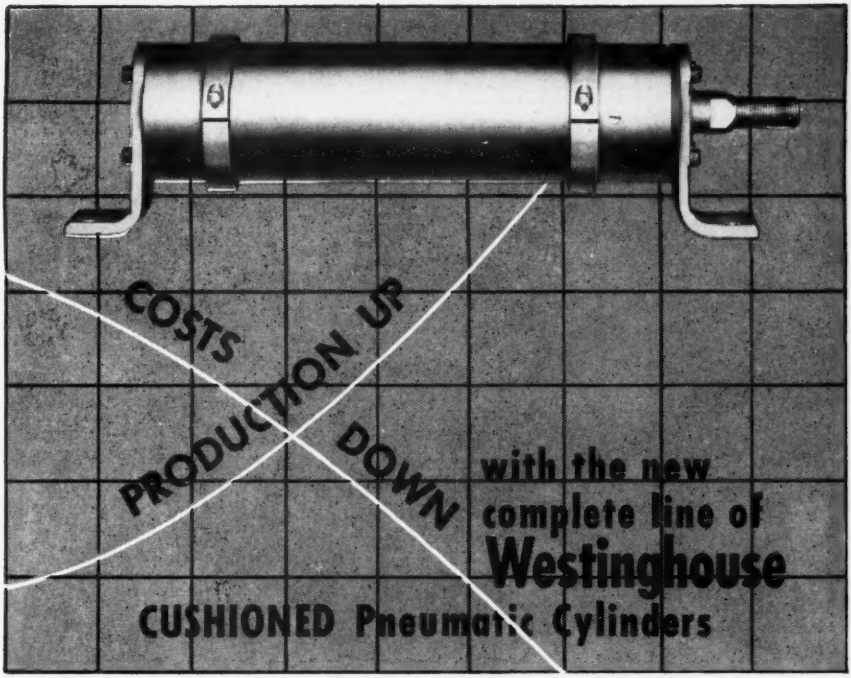
Cut Costs of Your **Stretch Forming** and **Low-Pressure Molding Dies** with Alcoa Aluminum Tool and Jig Plate*

- Moderately priced
- Strain relieved—machined both sides.
- Tolerances on plates of thicknesses from ⅛" to 4" held to within ± .010".
- Cut to any desired dimensions up to 48" x 96". Immediate delivery.

**For more information on Alcoa Tool and Jig Plate, contact your local Alcoa sales office . . . or write ALUMINUM COMPANY OF AMERICA, 1950-K Gulf Building, Pittsburgh 19, Pa.*

ALCOA

TOOL AND JIG PLATE



8 NEW PRODUCTION BOOSTERS

1. Diameters: 1½" to 8" . . . any required stroke
2. Cushioned adjustable stroke
3. Flange, foot, swivel, or trunnion mounting
4. Pressure type end seals against leakage
5. Rotating heads for easy installation
6. Solid construction
7. Stock heads, rods and barrels assemble to meet requirements
8. Packing cups of famous "WABCO" ® composition

. . . and a complete range of modern pneumatic controls



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TOOLING For PRODUCTION

STANDARD EQUIPMENT in
Progressive Screw
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Style "S"
Master Collets
and Pads

Style "B"
Master Feed Fingers
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LOW-COST PRECISION PRODUCTION

- **Style "S"**—the only Master Collet with no work pressure on the screw
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Also Hardinge-Sjogren Chucks, Draw-In Collets, and Collet Index Fixtures for accurate work holding and increased production.

Write for descriptive bulletins



HARDINGE-SJOGREN
Speed COLLET CHUCK

HARDINGE DRAW-IN COLLETS
FOR ALL LATHES AND MILLERS

HARDINGE COLLET
INDEX FIXTURES



Meet your B-RIGHT-ON *dealer*

Just as you must know your customers' needs . . . he knows yours. He really understands . . . as does every Brighton franchise holder . . . the uses and applications of socket screws . . . and is ready at any time to advise you.

One of his most important functions is to give you prompt service. He's johnny-on-the-spot . . . filling your order from his adequate stock, backed up by centrally located Brighton factory stocks.

He's proud of Brighton Screws . . . they're a real quality line . . . meeting all of your requirements, including the highest standards of strength, accuracy and uniformity.

Make your Brighton dealer a member of your production team . . . get his help on *any* socket screw question. If you're not already acquainted . . . write for his name.

- Socket Set Screws
- Socket Cap Screws
- Socket Head Stripper Bolts
- Socket Pipe Plugs

THE BRIGHTON SCREW & MANUFACTURING CO.

QUALITY B-RIGHT-ON PRODUCTS

Reading Road at Dorchester

Cincinnati 2, Ohio

Motion Study Pictures Show Waste Motion, Waste Time of Mechanical Clamping



SAVE TIME

By Eliminating Mechanical Clamping On Present Machines

Here's an interesting comparison between mechanical clamping and Sundstrand magnetic clamping. The job is the same in both pictures. In the upper illustration the part is held on the table with mechanical clamps. In the lower picture the same part has been located and clamped in a magnetic fixture. Lights attached to the operator's wrists show how excessive motion has been eliminated with the Sundstrand magnetic fixture.

There are other benefits available from magnetic clamping: longer tool life, more uniform clamping and elimination of operator's fatigue are a few. There are more. Investigate.



SUNDSTRAND MAGNETIC POWER-GRIP

FREE DATA is available on Sundstrand magnetic clamping fixtures. Write today. Ask for bulletin 524M.

SUNDSTRAND
Magnetic Products Co.
Division of Sundstrand Machine Tool Co.
1020-9th ST. • ROCKFORD, ILLINOIS

Outstanding British Machine Tools

JONES & SHIPMAN
HYDRAULIC SURFACE GRINDER

BRITISH INDUSTRIES CORP. INTERNATIONAL MACHINERY DIVISION

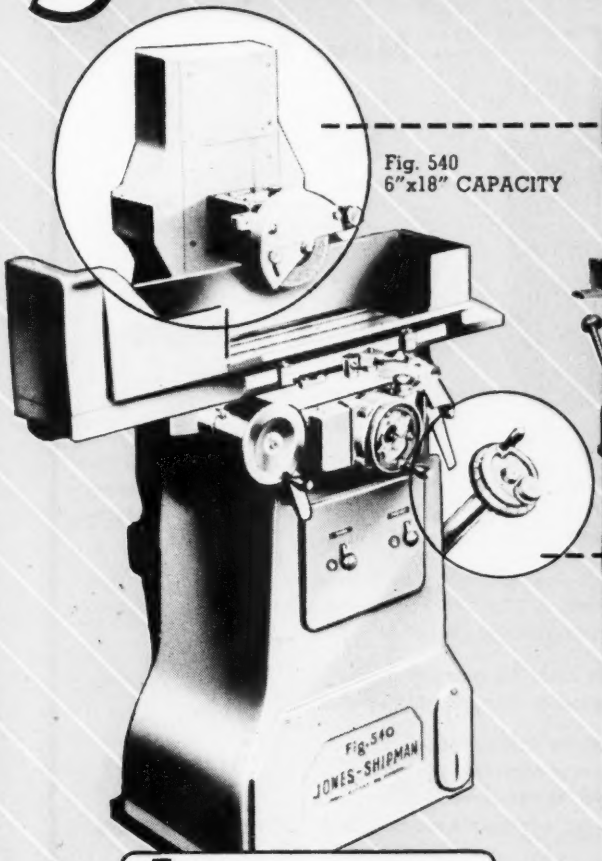
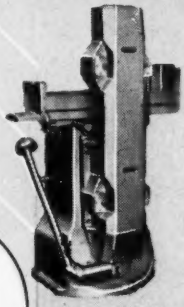


Fig. 540
6"x18" CAPACITY

FINISH—PRECISION!



The wheelhead slide is heavily counter-weighted eliminating bounce and resulting in unusually smooth low micro inch finishes. Its highly sensitive feed control is attributed to the use of preloaded ball bearing rollers running on precision ground bar guides. These features ensure the positive rigidity of wheelhead location in all positions and result in unsurpassed precision and quality of grinding finish.

PRODUCTIVITY—DURABILITY!

Simple controls are completely centralized, eliminating reaching and fatigue. Accurate reproduction of micrometer adjustments to .0001 eliminates considerable gaging. Smooth shockless table reverse at speeds to 40 F.P.M. ensures rapid metal removal without sacrificing finish. A low pressure hydraulic system means long life, little maintenance. Only the finest materials are used throughout.

JONES & SHIPMAN

OTHER FINE JONES & SHIPMAN MACHINES
Tool and Cutter Grinders • Large Surface Grinders
Plain and Universal Cylindrical Grinders

Longitudinal traverse of table, hand and hydraulic (maximum)	19"
Cross-traverse of table, hand and hydraulic (maximum)	6¾"
Vertical traverse of wheelhead (maximum)	11"
Table traverse speed range per minute	5 to 40 ft.
Micrometer cross feed graduated in	.0001"
Size of grinding wheel	7" × ½" × 1¼"
H.P. of wheelhead motor	1
H.P. of hydraulic pump motor	½
Floor space required with coolant supply	66" × 42"

DELIVERY 30 DAYS OR LESS



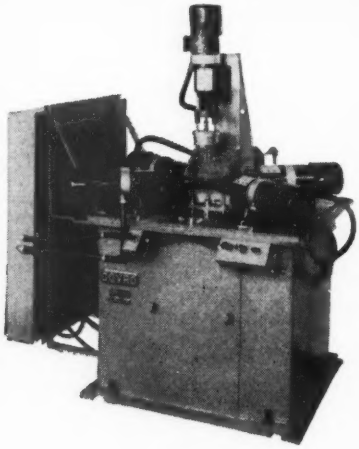
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Valuable 48 page catalogue describing and illustrating hundreds of outstanding machine tools.

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Gentlemen: Please send "British Machine Tools" to

Name.....
Company.....
Position.....
Street.....
City.....State.....

BRITISH INDUSTRIES CORP. 164 DUANE STREET NEW YORK 13, N. Y.



New Machine for Drilling 7 Holes Simultaneously

THE machine illustrated is an example of how Govro-Nelson self-contained Automatic Drilling Units can be arranged in a set-up to insure the proper location of various radial holes at a high production rate.

Incorporating 6 Model KH Drilling Units, one with a two-spindle head, the machine drills 5 radial holes and 2 parallel holes simultaneously in an aluminum part. Output rate: 500 parts per hour, or 3500 holes per hour.

In operation, the operator loads the part and touches the start button, whereupon the part is automatically clamped, drilled and unclamped.

If you have similar operations and would like to speed up your production rate, send samples and part prints and we shall be pleased to recommend the proper Automatic Units or quote on a complete set-up. Literature sent upon request.

WRITE FOR *Literature*

GOVRO-NELSON CO.

Machinists of Precision Parts for 28 Years

1933 Antoinette
Detroit 8, Mich.

Automatic **DRILLING UNIT**

Specialists in Designing and Producing Carbide Cutting Tools

WESSON BAND TYPE TOOL HOLDERS

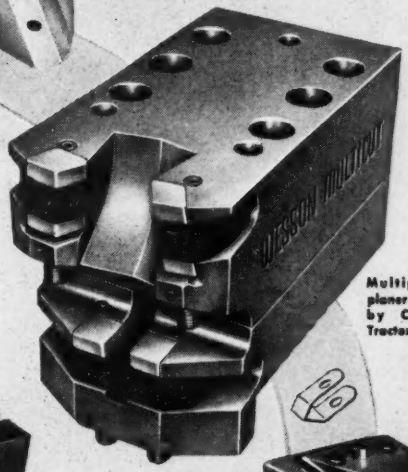
Special and Standard

with replaceable bands at low cost.

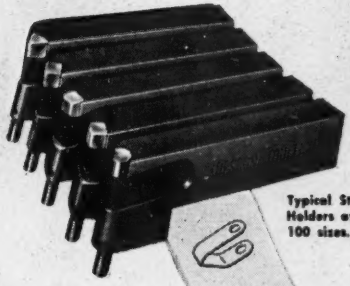


Grooving tool used on the Cadillac Tank.

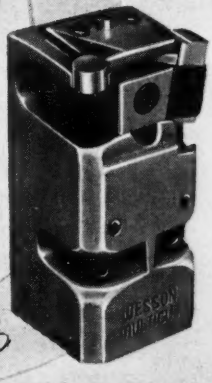
ALL THE WEAR ON THE BAND MEANS EXTRA ECONOMY, EXTRA EFFICIENCY, HOWEVER SIMPLE OR COMPLICATED YOUR TOOL HOLDER PROBLEM!



Multiple insert planer tool used by Caterpillar Tractor.



Typical Standard Wesson Tool Holders available in 10 styles, 100 sizes.



2 insert tool for turning Ford-Lincoln rear axle shaft on a Bullard Man-au-trol.

WESSON

Carbide Cutting Tools

First choice when tough metals are to be cut— for special or standard purposes— for single or multiple set-ups.

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FERNDALE (DETROIT 20) MICHIGAN
Affiliated with WESSON METAL CORPORATION, Lexington 34, Kentucky

There's a Walker Magnetic Chuck for Every Known Application . . .



RELIABILITY—STRENGTH

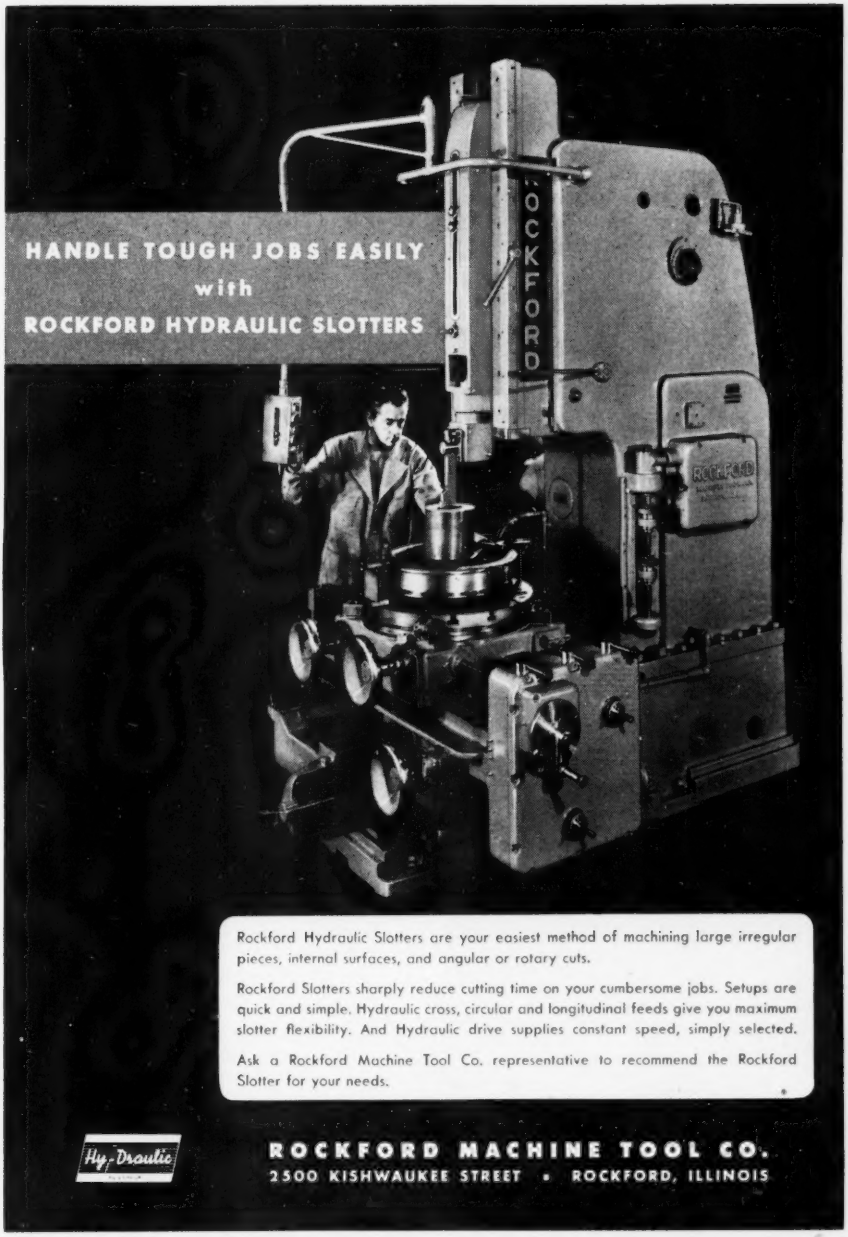
The Walker "Concentric Gap" Magnetic Chuck meets day-in, day-out requirements for a powerful holding device. For more than forty years, with a basic electro-magnetic circuit, the Walker "Concentric Gap" Chuck has proven itself reliable, efficient and economical.

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In Canada — Upton Bradeen & James, Ltd.


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Rockford Hydraulic Slotters are your easiest method of machining large irregular pieces, internal surfaces, and angular or rotary cuts.
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PLACE YOUR ORDER **NOW** FOR

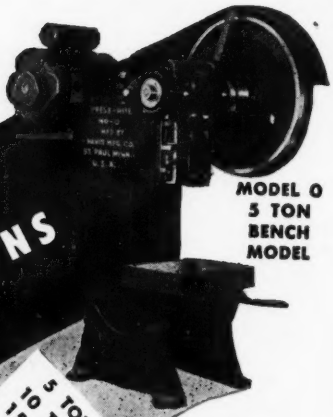
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OPEN-BACK INCLINABLE

POWER PRESSES

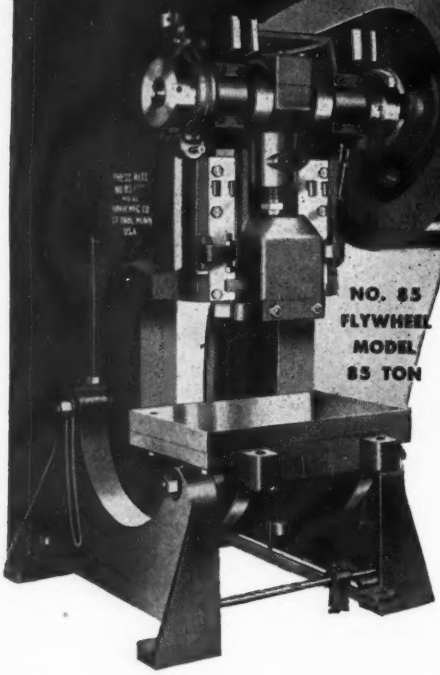
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A COMPLETE PRESS LINE 5 TO 85 TONS



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PRESS-RITE POWER PRESSES are now available in all models with reasonably prompt deliveries. Future material shortages may affect delivery schedules. Order now and have PRESS-RITE PRESSES in your plant for top production and lower operating costs. Take advantage of such PRESS-RITE features as Non-Repeat Single Stroke Safety Mechanism, Automatic Cam Actuated Brake, Greater Shut Height, and Triple Ramway Lubrication.

WRITE TODAY for free bulletin! You'll find that no press can match the PRESS-RITE'S many features.

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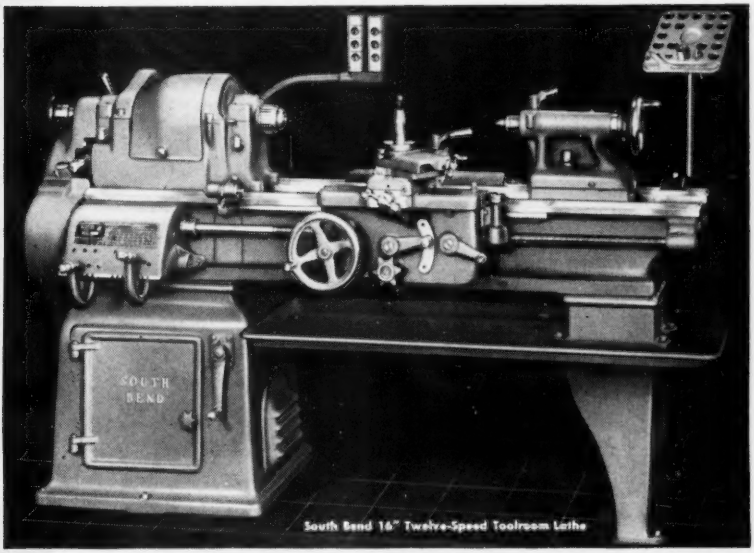
PRESS RITE PRESSES • SHAPE RITE SHAPERS • KELLER POWER HACK SAWS

2355 UNIVERSITY AVENUE • ST. PAUL 4, MINNESOTA

Cuts Machining Time

The wide range of spindle speeds on this new lathe cuts machining time because the operator quickly selects the right speed for each operation. Pushbutton control provides a fast change from any high speed to the corresponding low speed. This versatility is further increased by 48 choices of longitudinal and cross feeds which insure maximum efficiency on every job. Also, you will find that its accuracy and ease of operation make your tough jobs easy. Send the coupon for complete information.

SOUTH BEND 12 SPEED LATHE



South Bend 16" Twelve-Speed Toolroom Lathe

SPECIFICATIONS

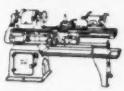
Spindle Speeds (approx.) Direct: high range 300, 550, 945; low range 150, 278, 475. Back gear drive: high range 32, 70, 118; low range 20, 33, 60.
Spindle Bore — 1⅜".
Swing over bed and saddle wings — 16¼".
Swing over saddle cross slide — 9⅝".
Distance between centers — 33¼", 45¼", 57¼", 81¼", 105¼".
Collet Capacity — 1" maximum.
Longitudinal Feeds — 48 R.H. or L.H., .0015" to .0841".
Cross Feeds — 48, .0006" to .0315".
Thread Pitches — 48, 4 to 224 per inch.

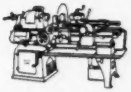
SEND INFORMATION CHECKED:

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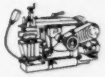
☐ TOOLS & ATTACHMENTS


☐ 9" and 10" BENCH LATHES


☐ 10" to 16-24" FLOOR LATHES


☐ ½" and 1" Collet TURRET LATHES


☐ 14" DRILL PRESSES


☐ 7" BENCH SHAPERS

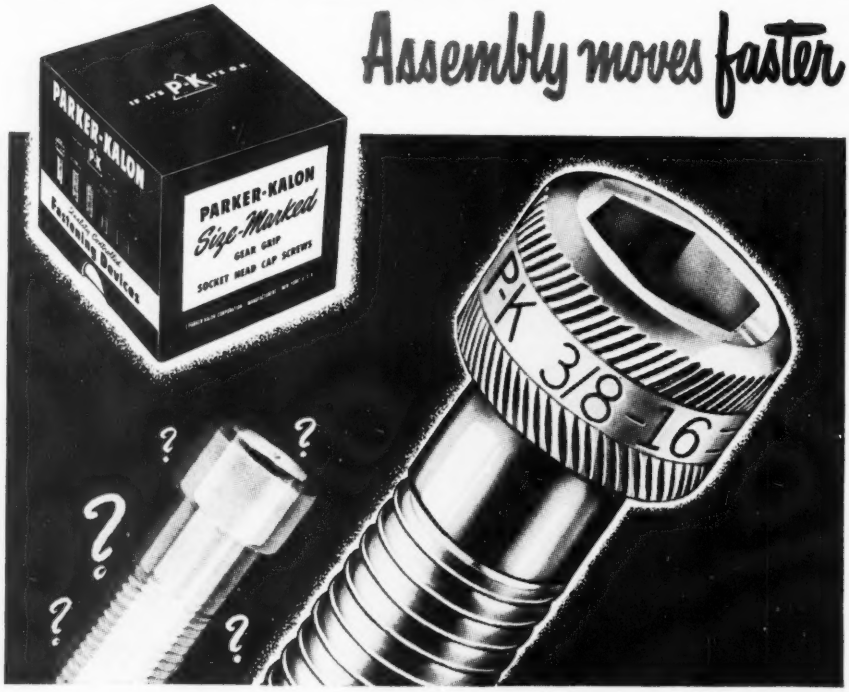
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Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana

When all eyes can read the size

Assembly moves faster



good judgment calls for
PARKER-KALON®
when good design calls for
SOCKET SCREWS



Your **INDUSTRIAL SUPPLY DISTRIBUTOR**— *your local source for P-K Socket Screws— works side by side with the P-K Assembly Engineer. Their combined efforts are solving many difficult problems of planning and procurement. Let them help you.*

Some sharp-eyed mechanics are expert at estimating the size of a plain head cap screw. But *most* assembly workers, and especially learners, need the screw that puts size beyond question . . . *the P-K Size-Mark Socket Head Cap Screw.*

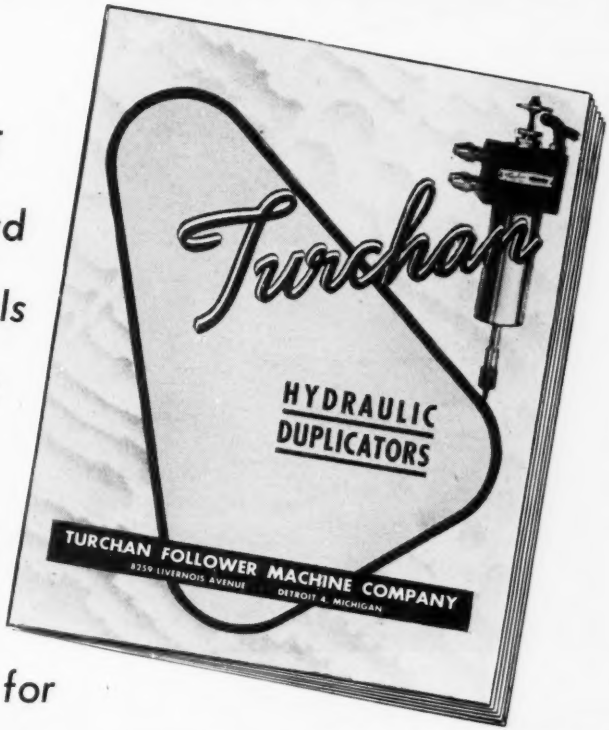
The size is clearly incised on the head, can be seen at a glance. Saves time and wasted screws when sizes get mixed up, prevents errors and spoiled work. It's a good sales feature, too, because installation and repair work on your product is simpler and easier.

Only P-K offers both Size-Mark and Gear Grip in Socket Head Cap Screws. Ask for samples. See how they save time and trouble all along the line. Parker-Kalon Corporation, 200 Varick Street, New York 14.

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NEW CATALOG

shows how to CONVERT your standard machine tools to automatic hydraulic duplicating! There are attachments for



LATHES, SHAPERS, MILLERS, PLANERS, GRINDERS

New 20-page booklet gives complete information on how to produce more work, faster, better — plus increasing versatility of your present machines. Improve and modernize now for tomorrow's demands.

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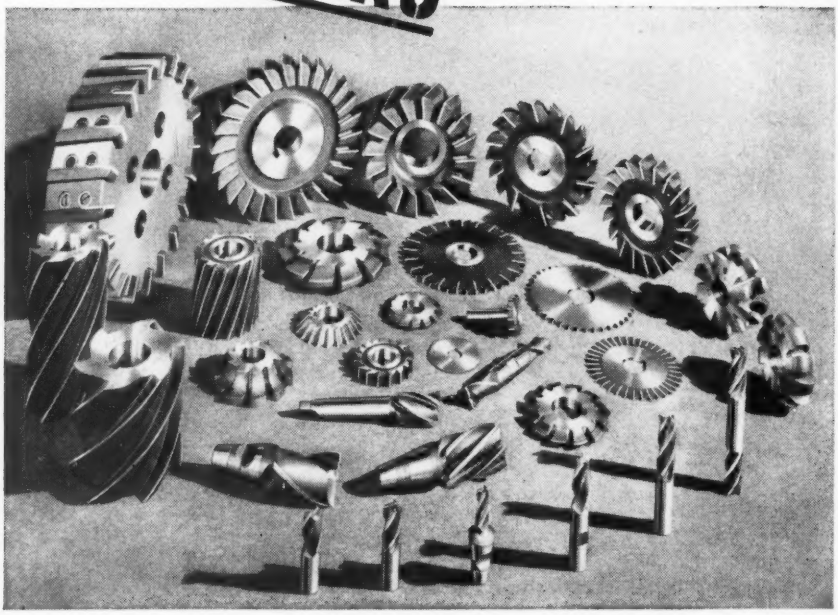
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CUTTERS



for Top Production at Minimum Cost

YOU CAN COUNT on high productivity from your millers when you specify Brown & Sharpe Cutters. Top production is assured by careful, controlled cutter manufacturing and strict adherence to design specifications.

Brown & Sharpe Cutters cut more freely, consume less power, and stay sharp longer. They are available in the broadest selection of types and sizes — write for Catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

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for 85% of all metal cutting jobs!

And it's a landslide for Cimcool® when these facts also go on the record: this radically new and different cutting fluid lowers costs . . . permits faster speeds . . . increases accuracy . . . and helps increase tool life.

Cimcool wins a sweeping victory over old-fashioned coolants because it's a *chemical emulsion.* It replaces all water emulsions and all but a few highly compounded specialty oils. Cimcool permits faster speeds and increases tool life because it combines friction reduction and cooling capacity in a degree never before attained. It's longer lasting, so Cimcool reduces downtime, cuts labor costs for cleaning and changing.

We know you'll give Cimcool a vote of confidence after a demonstration in one of your own machines. Just write us and we'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Or, if you prefer, write for our free booklet, "CIMCOOL Defeats Heat." Address, Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

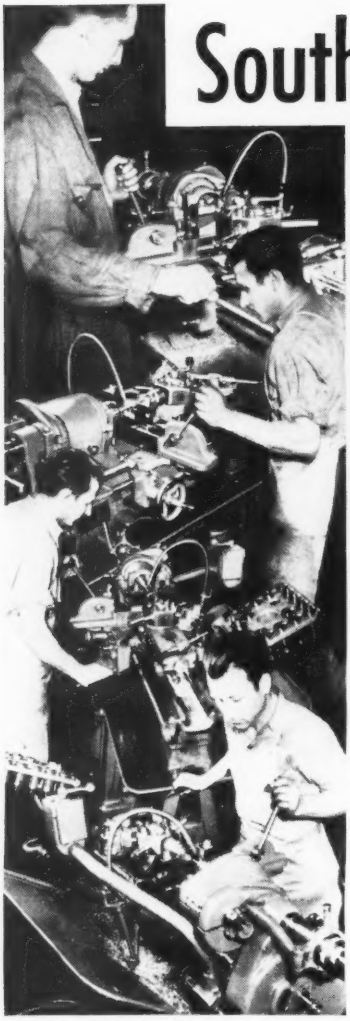
®Trade Mark Reg. U.S. Pat. Off.

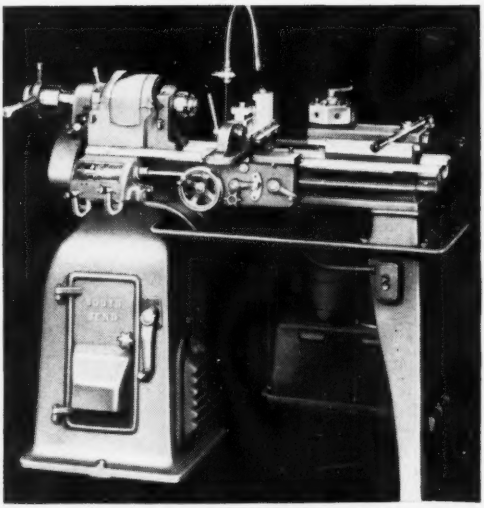
A Production-Proved Product of
THE CINCINNATI MILLING MACHINE CO.



for 85%
OF ALL METAL CUTTING JOBS

South Bend 1000 TURRET LATHE





Cost-Cutting Versatility

This precision turret lathe will cut your machining costs on small parts. Built-in accuracy, ease of operation and a wide range of speeds and feeds insure high production and close tolerances. Practical attachments simplify tooling for jobs which might otherwise require special fixtures. Find out how this versatile turret lathe can improve your machining — *send coupon now.*

SPECIFICATIONS

Swing . . . . . 10⅛"	Power longitudinal feeds
Turret to spindle . . . 19⅜"	48 . . . . .0015" to .0836"
Collet capacity . . . . . 1"	Power cross feeds 48
Spindle bore . . . . . 1⅜"	. . . . . .0006" to .0309"
Spindle speeds 12	Thread cutting feeds . . 48
. . . . . 55 to 1400 r.p.m.	. . . . . 4 to 224 per inch

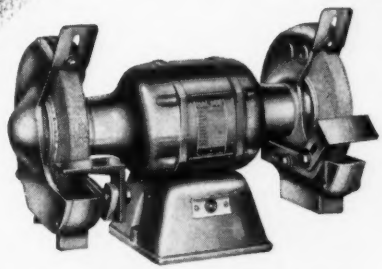
SOUTH BEND LATHE
South Bend 22, Indiana
Building Better Tools Since 1906

Send Information Checked:

☐ _____ ☐ 9" and 10" BENCH LATHES ☐ 10" to 16-24" FLOOR LATHES ☐ ½" and 1" Collet TURRET LATHES ☐ 14" DRILL PRESSES ☐ 7" BENCH SHAPERS

Name _____ Company _____

Street _____ City & State _____



NEW BALDOR

W-I-D-E clearance grinder

The new BALDOR Streamlined grinder, 8200 series, is excellent for grinding long and odd-shaped pieces as there's plenty of clearance between the wheels and the motor frame.

It is recommended for grinding off metal burrs, weld seams, rust, scale, etc. Has 3-way adjustable tool rests to permit angle grinding, and is equipped with exhaust type guards.

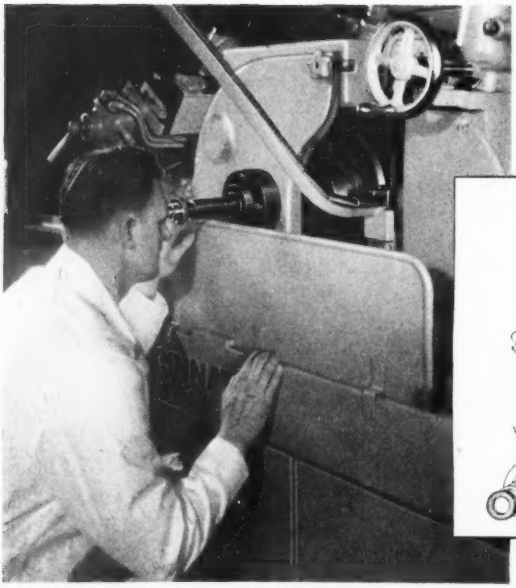
½ h.p., 3450 r.p.m., capacitor-start, capacitor-run motor GUARANTEED 2 YEARS against burn-out. Complete, as shown, **$86.00.**

ASK FOR BULLETIN 353

Baldor

BALDOR ELECTRIC COMPANY
4353 Duncan Avenue • St. Louis 10, Missouri

Research by world's leader in machine tools led to entirely new concept in CINCINNATI Grinding Wheels



RESEARCH SCIENTIST shown above is using optical instrument to check tiny deflections resulting from grinding forces.

THROUGH 25 years of research in chip formation, it has become increasingly apparent to Cincinnati Milling that the grinding process is a true metal *cutting* process. Research has proved that the grinding grits do not abrade or wear away the surface of a workpiece but form chips which agree in classification with the basic chip types found in other metal cutting process. Cincinnati Grinding Wheels stem

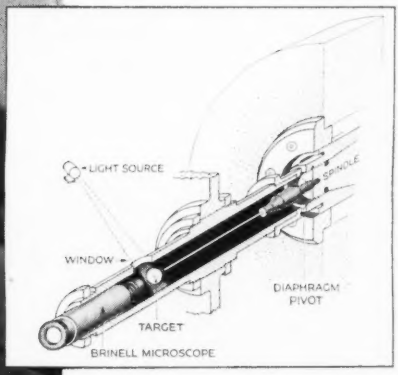


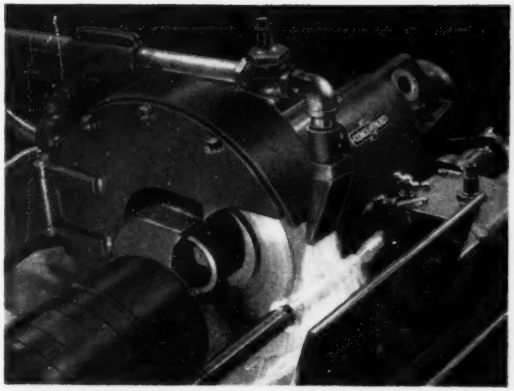
DIAGRAM of optical instrument which was developed by research laboratory of the Cincinnati Milling Machine Co.

from a frank recognition of these basic facts.

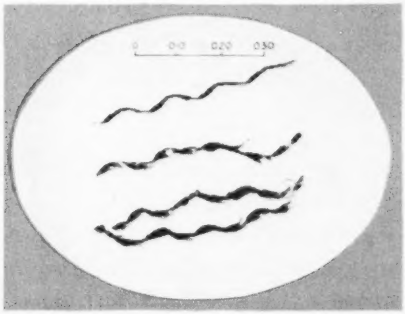
This new concept is the beginning of a whole new approach to grinding wheels—the development of the grinding wheel as a true cutting tool. And it is a development you might expect from Cincinnati Milling, with the world's largest background of research in metal cutting.

For you, this means grinding wheels developed and tested over a period of several years on the basis of true function—as true cutting tools forming true chips.

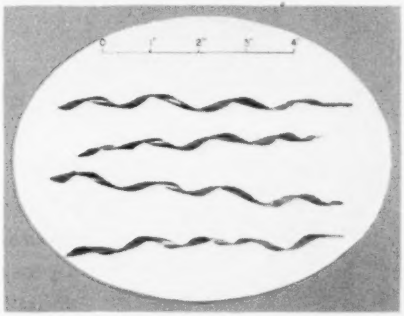
Furthermore, available to you is a field organization of trained machinists who know grinding and grinding machines as well as grinding wheels. For a demonstration on your own machines of how to get the most out of Cincinnati Grinding Wheels, just write, wire or phone us.



RESEARCH GRINDING problems have ranged from the grinding of surgical sutures .004" in diameter to steel mill rolls 60" in diameter.



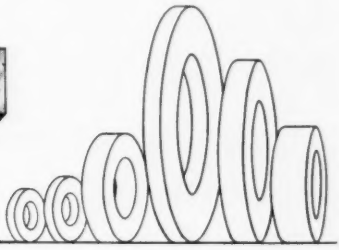
CONTINUOUS GRINDING CHIP obtained from grinding operation on SAE 1112 steel, selected to indicate the free chip formation possible under good grinding conditions.



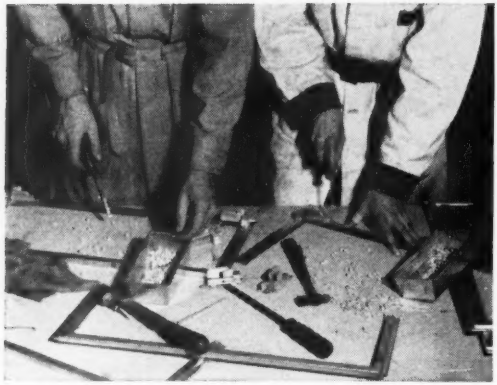
CONTINUOUS MILLING CHIP obtained from helical milling operation on SAE 1112 steel. Note similarity in shape to the grinding chips shown in the photomicrograph to the left.

FREE BOOKLET *Coming off the presses now is a brand new booklet, "A New Concept In Grinding Wheels." It contains many remarkable microphotographs, as well as a complete picture story of how Cincinnati Grinding Wheels are made. A copy is yours for the asking. Just write Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.*

CINCINNATI
Grinding Wheels
THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio

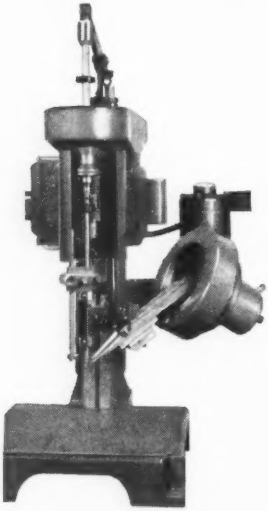


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THERE'S NO DETROIT POWER SCREWDRIVER



● Now—more than ever—speed in production is the order of the day—and D. P. S. Power Screwdrivers provide a wonderful contribution to present-day industrial needs . . . They are a "must" wherever the program calls for production assembling . . . They afford a tremendous gain over obsolete, slow hand methods. Detroit Power Screwdrivers will drive screws—any kind of screws—as fast as one as econd.

● Get our Catalog NOW, describing POWER SCREWDRIVERS, MOTORIZED HOPPER UNITS, NUT DRIVERS and SPECIAL ASSEMBLING MACHINES. Write today. Also send sample assembly for production estimate.

DETROIT POWER SCREWDRIVER CO.

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PRECISION PLUS+

for GAGE GRINDING and other CLOSE TOLERANCE WORK

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No. 6-12
SURFACE GRINDER

HERE is the New Grinder Sensation of the decade! . . . with all the features the metal working industry has been talking about PLUS—

Flatness and Parallelism GUARANTEED to within 2/10 (.0002) Low First Cost. Easy Operation. 8 to 10 Weeks Delivery.

The excellent performance of this machine tool, that has been *proved* in so many shops, is the net result of unusually sturdy design, fine quality materials and the untiring efforts of skilled craftsmen who know what a fine precision machine tool should do.



BOYAR-SCHULTZ
No. 6-18
SURFACE GRINDER

Write for Circulars

BOYAR-SCHULTZ CORPORATION
2120 Walnut Street • Chicago 12, Illinois

UNEQUALLED
for safe, hard blows

C/R JAW-HEAD



A perfectly balanced tool. Tough, resilient water buffalo rawhide faces deliver needed power, yet protect fine finishes and delicate parts. Faces quickly and easily replaceable. Safety-Flare handle gives comfortable grip and prevents slipping. When you need a "soft" hammer, make sure it's a C/R *Rawhide* Jaw-head.

Faces replaced in seconds

Merely loosening a nut releases jaws for replacing faces. When nut is tightened, faces are held in a vise-like grip.

Available from leading industrial suppliers. Also C/R Rawhide mallets, mauls, solid head hammers.

For further information write Dept. 22

CHICAGO Rawhide MFG. CO.

1301 Elston Ave., Chicago 22, Ill.

Canadian Distributor: Super Oil Seal Mfg. Co., Ltd., Hamilton, Ontario

"— and they chopped down the Old Pine Tree."



Woodsmen Use Marking Devices!

When a forester indicates a tree is to be cut by the lumberjack he usually paints a mark just above the ground and another about breast-high, indicating it is to be cut for lumber purposes. If the tree is diseased he usually marks it with an X or other suitable device, indicating that it is to be cut for destruction or firewood.

CADILLAC MARKING DEVICES

are Designed for ALL MARKING PURPOSES

Whatever your requirements, from small Hand Stamps to Pneumatic, Hydraulic or especially created Marking Machinery, CADILLAC stands ready to supply or design and build to meet your needs.





HEAVY BEVEL HAND STAMPS
CADILLAC Heavy Bevel Letters and Figures combine a high degree of hardness with toughness, insuring exceptionally long life.

INTERCHANGEABLE TYPE and TYPE HOLDER SETS

The faces of CADILLAC Steel Letters and Figures combine a high degree of hardness with toughness, insuring especially long life. All CADILLAC Marking Type and the recess in Type Holders are made in standardized dimensions. This means that type will fit interchangeably in hand holders, marking machine holders or punch press holders designed for the size type specified. Due to the precision adhered to in manufacturing, they will when assembled in any holder make impressions in perfect alignment.



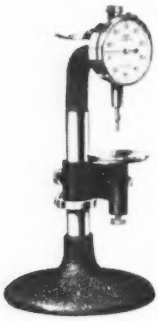
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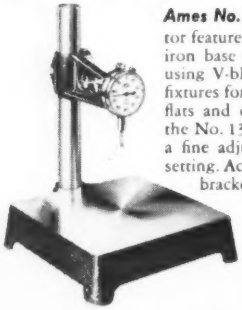
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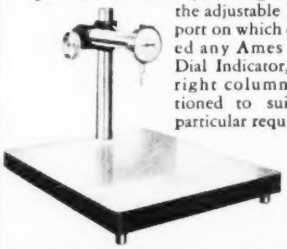
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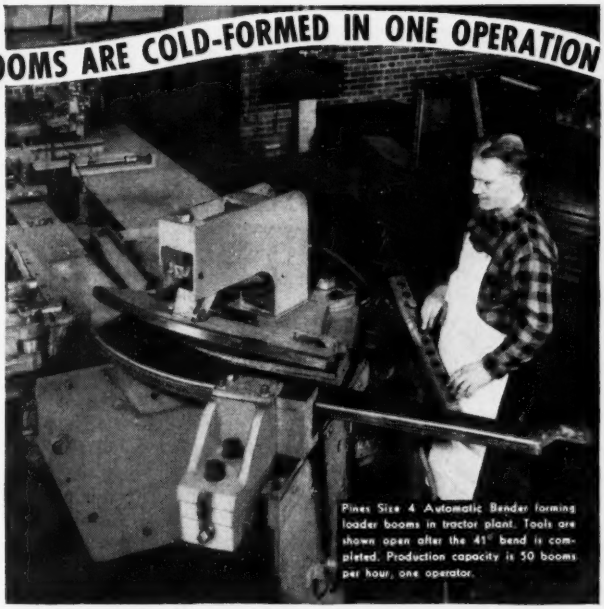
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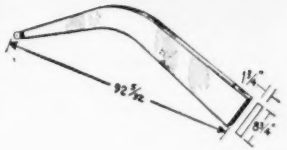
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Pines Size 4 Automatic Bender forming loader booms in tractor plant. Tools are shown open after the 41° bend is completed. Production capacity is 50 booms per hour, one operator.

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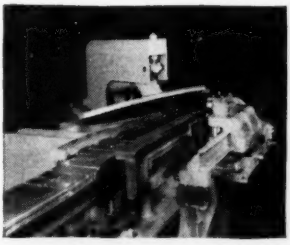
Here's another example of how cold-forming the "Pines-Way" speeds production and lowers costs. The setup illustrated shows tooling on a Size 4 Bender used for edge bending a heavy 12-gauge (.112″) hollow tractor loader boom. The pieces are fabricated with a gradual taper, and two straight U-shaped strips are arc-welded together. By adopting the Pines bending method, instead of making curved pieces on a press, a substantial reduction in die cost and scrap losses are affected.



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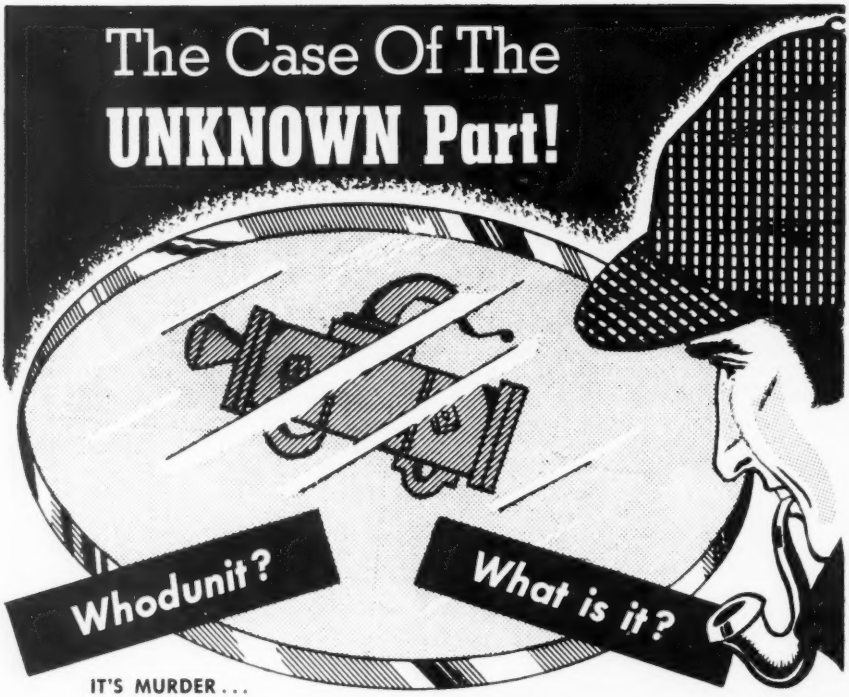
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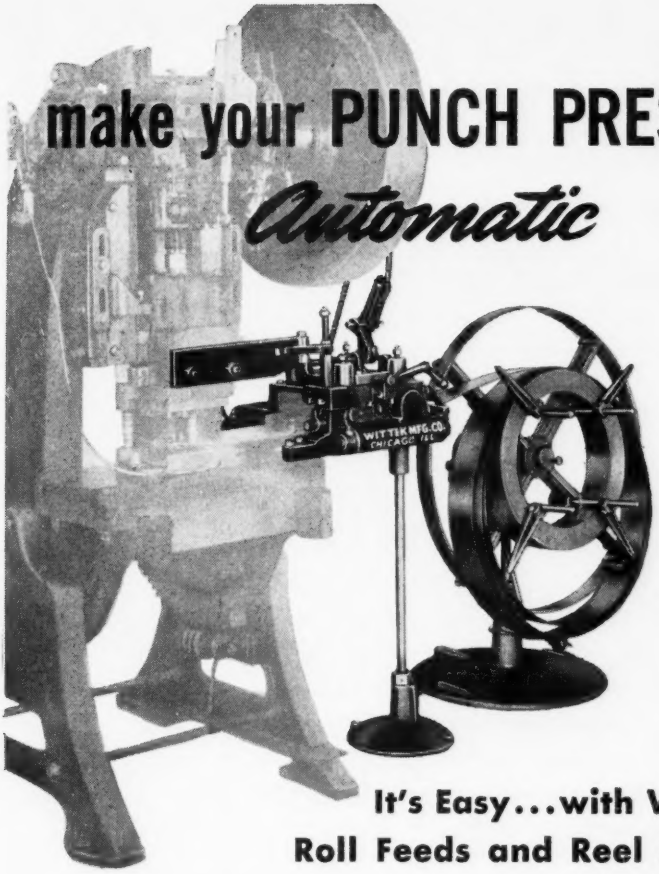
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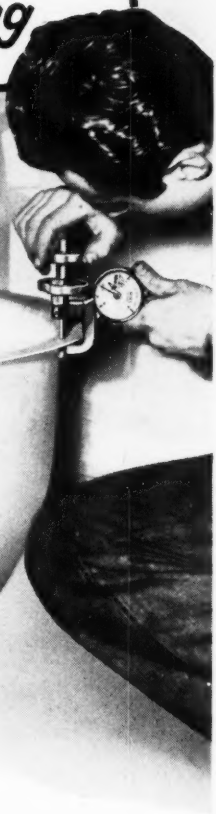
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over the editor's desk

Listen Americans!

IF you were Joe Stalin and wanted to conquer the United States and thus have mastery over all the world, your first primary interest would have to be this nation's industrial production. It would be impossible to defeat America while her full industrial might is in action. Joe Stalin knows this. He and his politburo and the Communist Fifth Column in America are working now in every conceivable way to cripple American industry. There is a direct way—through arraying employees against employers, provoking crippling strikes and destroying cooperation; and an indirect way—through activities designed to cripple our economy or monetary stability.

If the Communists could engineer a general strike tomorrow and keep our major industries closed down for six or 10 or 12 months, the full tide of World War III would be unleashed by Stalin. But the Red director is realistic enough to know that millions of loyal American industrial workers now have their eyes wide open and the strike strategy could be only a partial success.

To bring the downfall of America's financial structure and thus paralyze our industrial production, the 40,000 Red conspirators and their nearly half million fellow-travelers here are being instructed to constantly agitate for bigger government spending and ever more hampering govmental interference with industry.

Government spending has already been expanded to a point where billions of borrowed money are being spent and destructive inflation may not be held off even until after the fall presidential election. Likewise governmental policies have been drastically restrictive on business and industry, hampering normal management practices and giving more and more control into the hands of incompetent politicians and bureaucrats.

Stalin doesn't want a Russia - U. S. A. war at this time. He wants to withhold the full war tide until the U. S. can be more seriously crippled internally. Thus U. S. production is the key to war or peace. If we keep our production going, our business system healthy and expanding normally in private hands; and if we bring common sense into government spending and the handling of our public financial affairs, we will be erecting a long-time blockade against war. Every citizen who loves peace and freedom and is dedicated to the idea of human progress has a stake in seeing that these necessary objectives are achieved.

—By GEORGE S. BENSON,
President of Harding College

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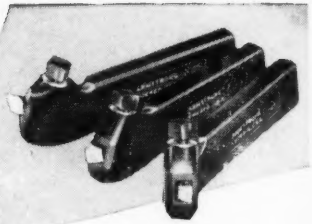
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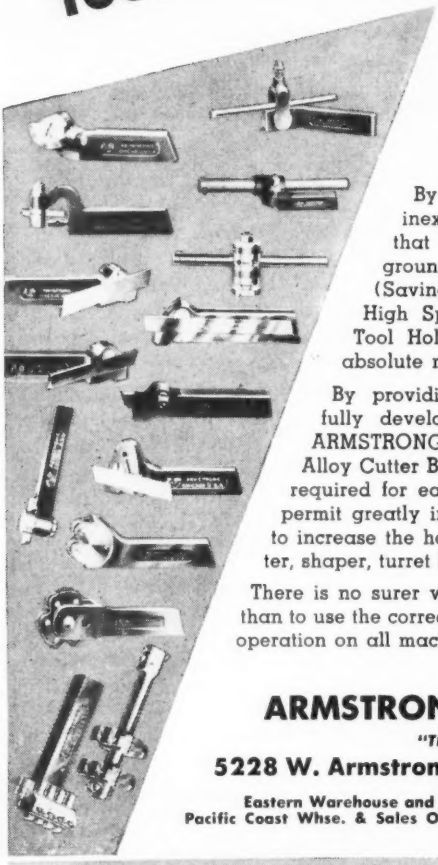
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FEATURES IN THIS ISSUE

MODERN Machine Shop

Vol. 25, No. 5
OCTOBER, 1952

Boring Mill Characteristics and Work, Part I — ***By John E. Hyler***

In this, the first of a series of articles, the author discusses various features and characteristics of a variety of vertical boring mills. Page 124.

Everyone Profits Through Grinding Wheel Standardization — ***By Fred W. Vogel***

A review of the progress which is being made by grinding wheel manufacturers in the direction of obtaining greater standardization of their products. Page 134.

Constant Tolerance Forming Dies — ***By Gilbert C. Close***

In which the author describes a new molding technique for dies which is designed to considerably reduce the amount of time now spent on grinding and polishing. Page 146.

The Case for the Tailor-Made Gage — ***By Clifford W. Kennedy***

The author clearly explains how special gaging equipment is being designed to meet the challenge of unusual workpiece construction. Page 162.

Let the Subcontractor Beware — ***By Robert J. Flynn***

The author draws upon his own personal experience to offer some timely tips on how to handle some oft-overlooked details relative to subcontracted work. Page 180.

American Society for Metals National Congress and Exposition

Program of the National Metal Congress and Exposition which is sponsored by the American Society for Metals, the American Welding Society, the American Institute of Mining and Metallurgical Engineers, Institute of Metals Division, and the Society for Non-Destructive Testing to be held in Philadelphia, October 18 through 24. Complete floor plans and a list of exhibitors are included. Page 192.

Boring Mill Characteristics and Work, Part I

In this, the first of a series of articles, the author discusses features of vertical boring mills.

By JOHN E. HYLER

THE term "boring mill" usually refers to vertical-spindle machines holding large work to be turned and bored on a revolving table, with its axis vertical. However, the term has been rather loosely employed. In the minds of many, it also relates to horizontal-spindle machines. Actually, the average vertical boring mill does much more turning than boring. Horizontal-spindle machines sometimes referred to as horizontal boring mills are employed for boring, drilling and milling.

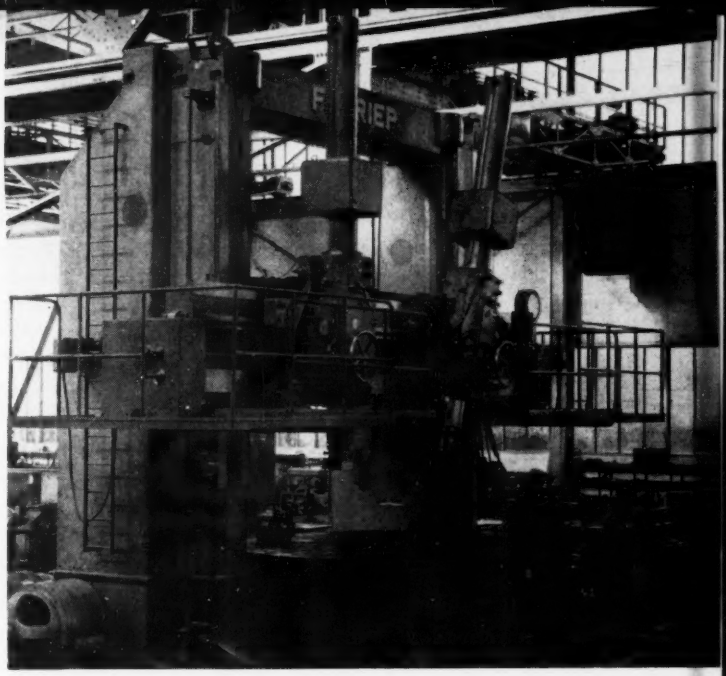
Wide difference in design and application of the two types of machines requires consideration of each, separate from the other. We first turn our attention to the vertical boring mill, or, as called by some, vertical boring and turning mill. The first thing a seasoned mechanic notes concerning this machine is its close relation (in principle) to the lathe. Postulate lathes sufficiently massive, together with adequate equipment for handling and attaching to their faceplates the heavy parts machined on vertical boring and turning mills, and all such work can be performed on a lathe.

The tremendous advantage of substituting a rotary table with its working face in a horizontal plane, however, for a lathe faceplate with its working face in a vertical plane, is immediately evident where very heavy work is involved. This was undoubtedly the first consideration leading to development and use of a vertical boring and turning mill.

Location of Cross Rail

In the interest of rigidity, it is always best to have a boring mill cross rail located as low as possible on the uprights, consistent with work being done. All machining can then be done with the least possible amount of tool bar extension. Vertical cross rail adjustment on most machines is made by power. Lever control for this purpose was provided on many early machines.

Modern boring mills often have the cross rail raised and lowered by individual motor, controlled by convenient push-button. Controls for cross rail elevation are sometimes incorporated in a pendant push-button station. Cross rail clamps may be either electrically or manually operated. Some machines incorporate limit switches, the function of which is to automatically disengage the cross rail



Shown here is a highly competent vertical boring and turning mill, having a table 140 inches in diameter, and capable of swinging workpieces 150 inches in diameter. Note one of the tool bars is set for a tapering cut. Observe enclosed walk-way around machine from the two ends, giving easy access to operator's position at each tool bar. Illustration courtesy The Cosa Corporation.

elevating mechanism when the cross rail reaches its highest or lowest position.

On exceptionally heavy boring mills, some firms optionally provide uprights of the type on which the cross rail may be power adjusted for height, (for machines requiring frequent adjustment) or a block-type upright (to which sections may be added, or from which sections may be removed) for boring mills requiring only occasional changes of cross rail height.

Cutting Principle Similar to Lathe

As on a lathe, cutting tools for a vertical boring and turning mill are stationary except for feeding motion, while the work revolves. On the boring mill, however, two or more tools are often cutting simultaneously. Conventional vertical boring mills are equipped with two tool heads, so carried on saddles that they may be traversed horizontally along the cross rail, to which the saddles are mounted. When a flat upper surface is being turned, (corresponding to a facing cut at a lathe) feed involves traversing toolheads horizontally on the cross rail.

Each tool head is provided with a slide in which a tool bar is carried. Each tool bar is arranged for vertical feed. Thus, either tool may be fed either horizontally or vertical, as the need may arise. Often, feeding action may be obtained either by power or by hand, as seems convenient. Where a cylindrical surface is being either turned or bored, plain vertical feed is used on the tool bar.

Feeding is obtained by means of two horizontal feedscrews, housed within the cross rail, arranged on the same axial line, and by two splined shafts, arranged above and parallel with the feedscrews. Each of the two toolheads is equipped with its own feedscrew and its own splined shaft, arranged in parallel. Feedscrews are employed for traversing saddles and

toolheads horizontally along the rail, while spline shafts provide vertical feed for each toolhead as required. These horizontal feed shafts are, in turn, driven by two vertical shafts, flanking the two ends of the machine, through proper bevel gearing connections at the two ends of the cross rail.

Aspects of Feed Changes

Feed changing devices are incorporated, by means of which the speed of the vertical shafts may be changed. Therefore, the amount of feed may be varied. Provision is often made for obtaining feed changes in geometric progression. Levers are arranged on the sides of the boring mill for selecting vertical or horizontal movements of the particular toolhead involved, for feed changes, for direction changes with reference to feed or traverse, and for selecting between feed and rapid traverse, as the need arises.

Actual levers and control arrangements differ in some measure on machines made by different firms. Many modern machines are provided with convenient levers for selecting, engaging, disengaging and reversing direction of either feed or power rapid-traverse movements of both saddles and tool rams. Levers employed are practically always arranged on the same side of the machine as the saddle or the tool ram to be governed. While feed is usually governed mechanically, some large modern machines can be provided with electronic feed mechanisms if desired.

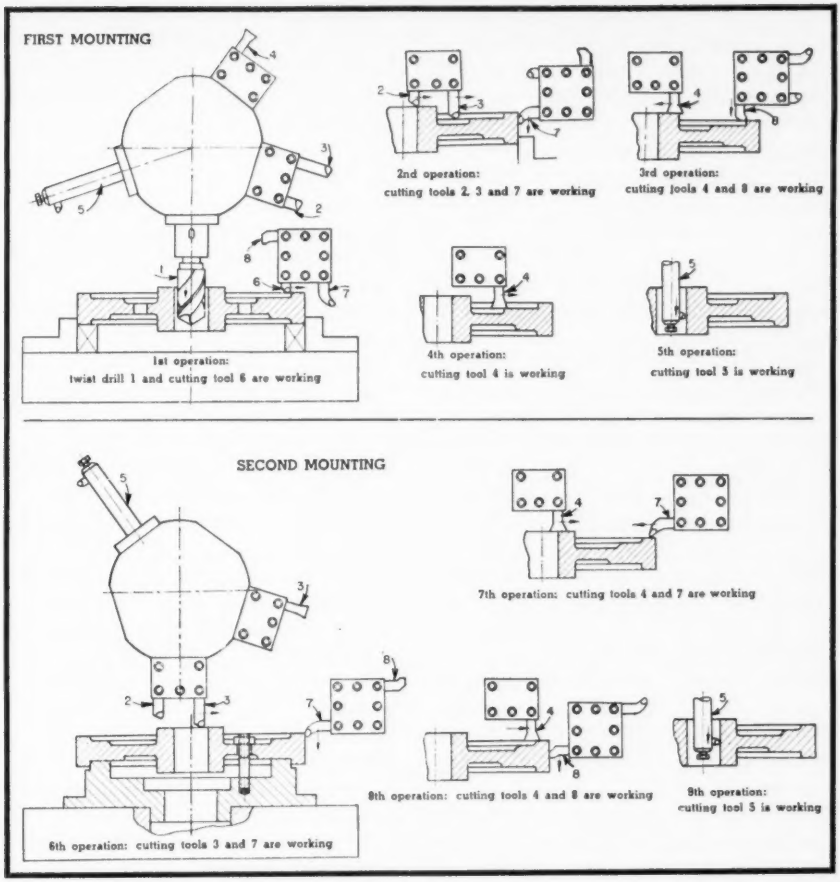
Where electronic feed is employed, the feed for each head is generally actuated by individual electric motor, controlled by push buttons, with feed changes being selected by electrically-operated clutches in an enclosed gear box at each end of the cross rail. Where electronic feed is used, it can be varied in fine increments while the cutting operation proceeds. This is very important in connection with use of carbide tools. It permits obtaining full efficiency from both cutting tools and machine. Push buttons employed for governing feed of this type on large machines are often made portable and, therefore, may be kept convenient to any point where operator is stationed.

Milling Attachments and Feeds

In relatively rare instances, where milling is performed with vertical boring and turning mill, a milling attachment must be applied to the end of a tool spindle. Such milling attachments are available with certain new machines when desired. Where milling is performed, it is necessary to provide both tool heads and machine table with suitably slow feed speeds for milling.

In addition to vertical boring mills of medium size and larger, conventionally equipped with two toolheads, many smaller vertical mills carry a single tool head on the cross rail. This head usually mounts a turret. As many as five tools may be carried in the turret simultaneously. In most instances, all necessary tools for boring and turning a given part can be held in the turret. Consequently, little time is lost in changing from one tool to the other. In a few cases, where it has been found expedient because work more intricate than ordinary is being handled, a large conventional machine equipped with two toolheads has also been provided with a turret on one of these heads.

The type of vertical boring mill referred to as a vertical turret lathe practically always incorporates a so-



Drawings showing steps in machining a fly-wheel on a highly-competent boring mill of vertical turning lathe type, equipped with a side head. The pentagonal turret shown is carried on the tool bar mounted on the machine cross rail, while the square turret to the right is mounted on the side arm of the machine. Drawings courtesy The Cosa Corporation.

called side head. Vertical feeding movement is provided for the side head, and horizontal feed for sidehead tool bar. The side head or side arm is usually provided with a turret, designed for carrying four tools. On some machines of this kind, the feed box provided for the side arm is of identical design with that used for the cross rail head. Each operates independent of the other, and incorporates gearing for both feed and rapid power traverse.

Electromagnetic Clutches

On some machines, all feeds and rapid motions are controlled through electromagnetic clutches, with single-

lever control from a pendulum switch board located convenient to the operator. The purpose of using a boring mill with a side head, rather than one with two toolheads located on cross rail, is that it permits many types of smaller work to be done, using more than one tool simultaneously, without one interfering with the other. There would necessarily be toolbar interference if the same simultaneous machining were attempted on a conventional mill, carrying two toolbars on the cross rail.

Various aspects of control recently applied to vertical turret lathes or boring mills have in various cases revolutionized production operations. Certain instances have been noted in which either manual or automatic control may be employed, and where automatic control is selected for use on highly-accurate repetitive work. Great production value is inherent in the use of controls allowing automatic changes in the direction of feed, also automatic precision indexing of turret heads for one operation after another. These controls contribute to higher production, and greatly reduce operator fatigue.

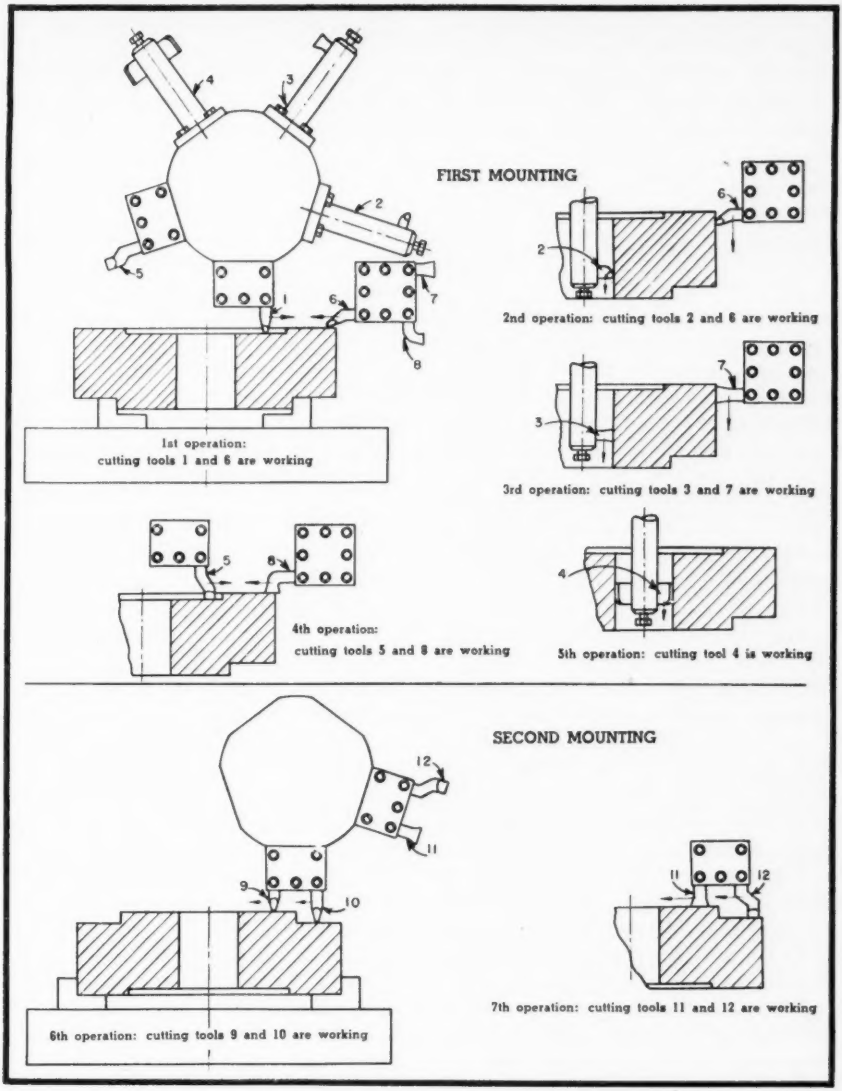
On very large size boring mills, the importance of having adequate control equipment is being realized more and more. Certain large machines are provided with four different push-button stations for the feed, located on the two sides of the table at floor level, and at the two toolhead saddles, respectively. While the feed motion of each head can and usually does operate independent of the other, it is possible to lock the two feed motors in synchronism. When thus locked, both feeds operate as from a single motor. Consequently, they operate in perfect time in reference to tool advance.

Purpose of Incorporating Feed Synchronism

There is definite reason for providing this type of synchronism. Cases arise where it is found expedient to take a very heavy cut, but to divide the one cut between two tools. On such an operation, were not the two feeds synchronized perfectly together, one tool would inevitably advance somewhat faster than the other, and would soon be taking the entire cut. It is necessary, where this type of operation is being performed, to use great care in setting tools to same projection or registration to begin with. Synchronization may be obtained with reference to vertical travel of tool bars, or horizontal travel of saddles, as desired.

In effective synchronization of the two feed systems, the right-hand feed motor is used as a master. Then the left feed motor is synchronized to it. A mechanical differential mechanism is employed between the two motors. When the two motors are in step, the differential naturally has no output. Whenever differential does have a rotary output, that output is equal to the difference of the two motor revolutions. The differential output is employed to drive a potentiometer rheostat. The potentiometer rheostat is incorporated in the electronic control circuit of the left feed motor, in such manner as to correct its speed automatically and continuously, to agree with then-prevailing speed of right-hand feed motor.

An electronic feeding mechanism may be used to provide control over a wide range. An idea of this can be obtained in reference to one 30-foot machine, on which the feed mechanism



Drawings showing steps involved in machining a steel wheel on vertical turret lathe type of boring mill. Drawings courtesy The Cosa Corporation.

is controlled by means of an electronic rectifier, where the feed has a range of 1500 to 1. Specifically, the speed range of the feed is from 0.004 in. to 6 in. per minute. In addition, there is a rapid-traverse speed of 72 in. per minute.

Power reaches a 20 hp, DC feed traverse motor from alternating current lines, by first passing through the electronic rectifier. The entire feed range mentioned is accomplished because the motor itself has a very wide speed range, and because one automatic gearshift is incorporated.

Side Heads on Conventional Boring Mills

Another variation in vertical boring and turning mill design is that of equipping the cross rail on machines of medium size with two tool heads, yet providing a side head for the machine, the same as is done in connection with the vertical turret lathe type. This arrangement adds considerably to both machining accuracy and to overall work-handling capacity on some kinds of work. Some modern machines of this kind are provided with a feed box making available 16 different feeds, ranging from 0.003 in. or 0.004 in. to ½ in. or ¾ in., depending upon the size of the machine.

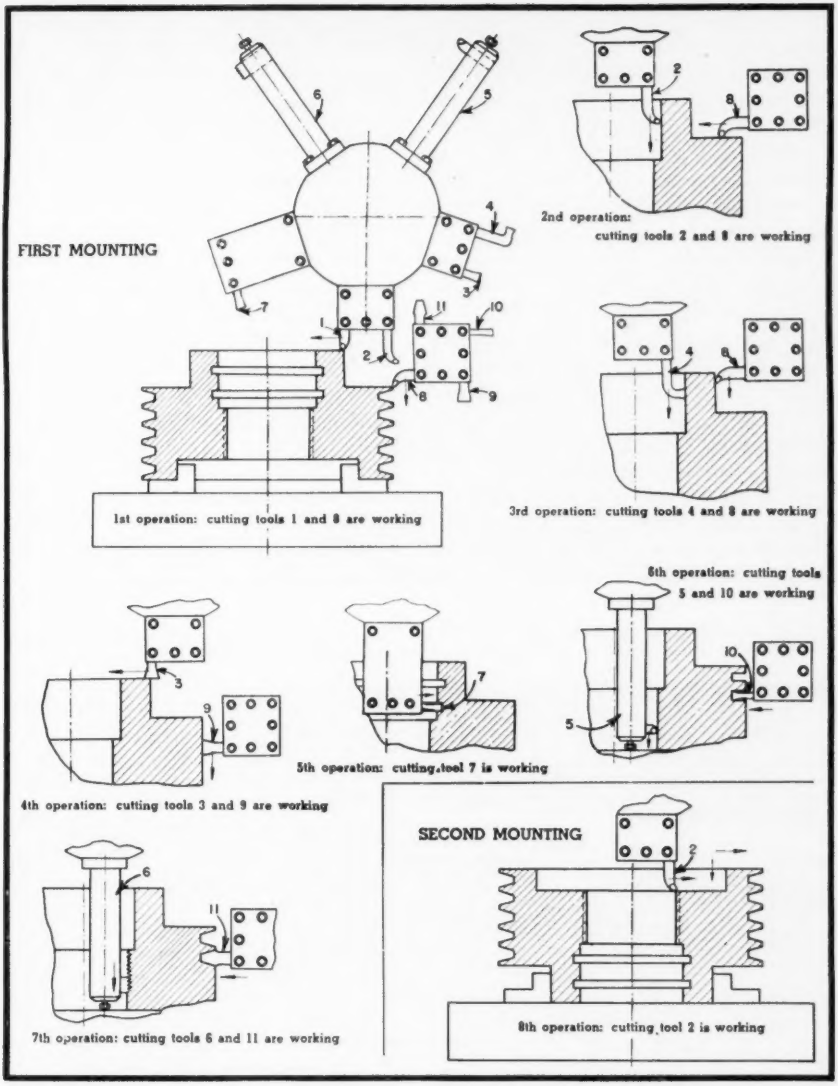
On these machines, an independent feed reverse is provided for both saddle and ram. Therefore, the saddle can be moved in or out, or the ram up or down, individually. These movements are instantly obtained by means of push button control. There are definite selective positions for each one of the 16 feeds, which are clearly delineated on the control unit for each head.

A large amount of weight is incorporated in the tool slides of many large vertical boring mills. It is consequently necessary to counter-balance them. Conventional vertical tool slides are often fitted with a wire rope, passing upward over a sheave, and then down to attach to a counterweight. Provision is made (by increasing or decreasing actual amount of weight in counterweight) to compensate for heavier or lighter tooling employed. However, some modern machines have tool rams counter-balanced by means of flat spiral springs, enclosed in cases and fitted to openings in the swivel. In this case, tension is adjusted by means of a ratchet mechanism, and is easily increased for extra-heavy cutting tools.

In cases where thread cutting or drum scoring is involved, close control of the ram feed is especially important. Some modern boring mills are provided with helical rack and pinion on the ram. This arrangement greatly improves feed movements.

Diameter Range in Boring Mills

Very deep roughing cuts can be taken on a vertical boring mill. Work usually handled is very large in diameter in proportion to its height, since it is positioned on the machine table. However, work varies greatly. Some types of boring mills are built in a wide range of sizes, in order to be more particularly adapted for specific diameter ranges. On small machines, the work handled may vary from around 2 feet upward. Many machines are in use handling work 8 to 10 feet in diameter, and a large number for work ranging from 10 to 30 feet in diameter. Occasionally, an even larger machine is developed and put into use. A 42-inch machine has been built for General Electric Company, which will handle a load as great as 350 tons. This machine, incidentally, was used to machine its own table while in process of manufacture. The drives for boring mill tables are important and interesting. Obviously, it is needful to vary the speed of the table for turning, when



Drawings illustrating steps involved in machining a five-groove, V-belt pulley on a vertical turret lathe type of boring mill, equipped with a side head. Drawings courtesy The Cosa Corporation.

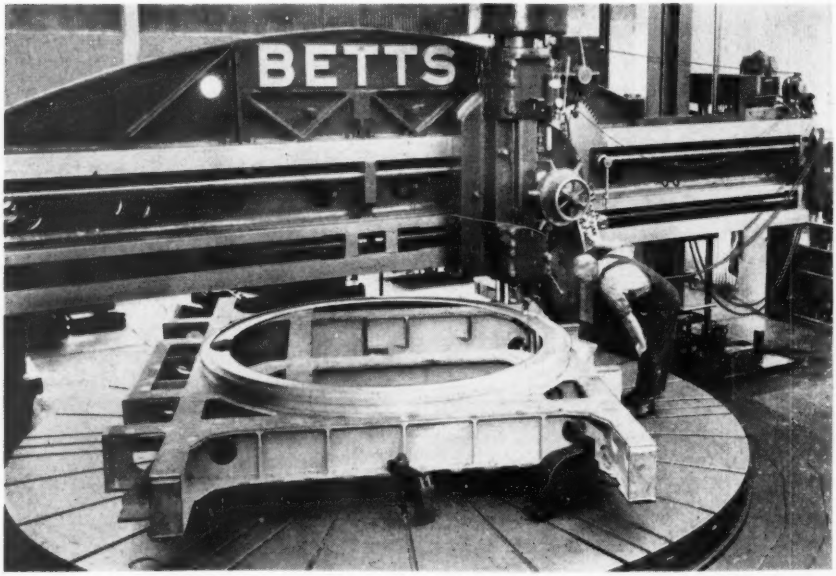
changing to large or small parts. Many boring mills have provision for varying the table speed by shifting a transmission belt on step-cone pulleys, also

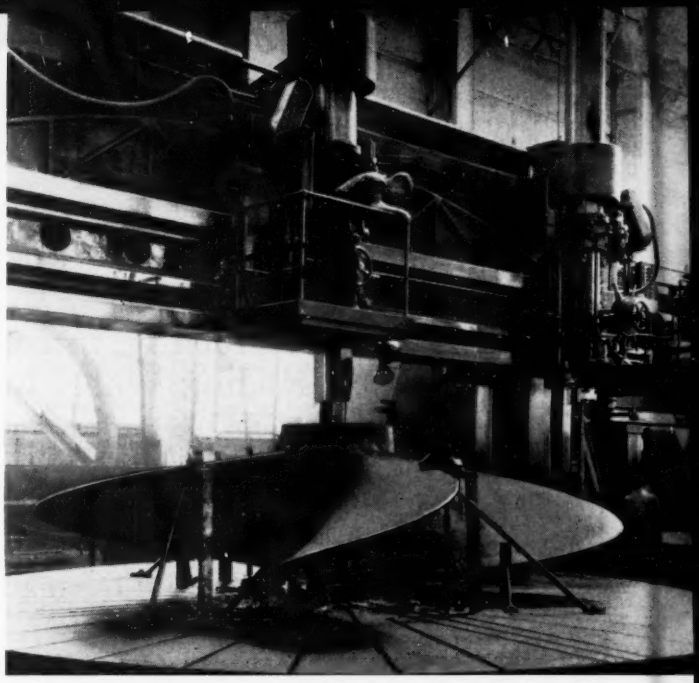
by means of back gearing, controlled through a lever. Speed changes on modern machines are quite often obtained through hardened steel sliding gears and positive clutches, mounted on multiple-spline shafts of large diameter. In various instances, a variable-voltage adjustable-speed direct-connected motor is employed.

Table speeds available are often geometrically graduated. Where an adjustable-voltage drive is employed, however, the table speed may be made infinitely variable within its scope. The 42-foot machine previously mentioned has a table 20 feet in diameter, and has a table drive obtained through an adjustable-voltage drive from a 100 hp motor. The table speed is capable of variation anywhere from ¼ to 10 rpm. One 30-foot machine in operation has its table driven by two DC motors of 150 hp each. This machine has a table 25 feet in diameter. It can be driven at a maximum of 12 rpm, yet it is possible (through combined gear changes and adjustable voltage) to reduce table speed to a minimum of 0.002 revolutions per minute.

In this case, the reason for providing such very slow table speed is that certain milling operations will be performed, with the table providing the feeding motion. This is an unusual function for a vertical boring mill. The total speed ratio in this table drive, it will be observed, is around 6,000 to 1. The large amount of motor horsepower provided for the table drive is considerably greater than needed at present. It has been incorporated with the idea that future power demands, in face of the strong possibility of improved machining developments, may

The highly-competent vertical boring mill seen in operation here is a Betts 20-foot unit, shown machining a gun mount part. Illustration courtesy Consolidated Machine Tool Corporation.





In this interesting illustration, a Betts 25-foot vertical boring mill is seen machining the taper bore in an 18-foot propeller. Note the operator rides a platform mounted on machine toolhead saddle. Illustration courtesy Consolidated Machine Tool Corporation.

require more power than now needed.

The possibility of obtaining such an extremely wide speed range on a large boring mill table, through combining two different gear ratios with adjustable-voltage control, is a highly interesting one, and one that will undoubtedly be applied in other cases in the future. Interest in the application of adjustable voltage control for vertical boring mill table drives has been increasing for some time. Very slow table speeds may be used on this machine where boring or turning cuts are removing large amounts of metal. High speeds may be used for fine finishing cuts, or for cutting on small-radius work where necessary.

Aluminum Forming. Published by Reynolds Metals Co., 2500 S. Third St., Louisville 1, Ky. 148 pages. 6 x 9 inches. Illustrated. Plastic ring binding, heavy paper covers.

This book is devoted mainly to a detailed explanation of how to form aluminum. The contents are divided into four sections, two of which contain metallurgical data, one on aluminum sheet and plate and the other on aluminum tubing and pipe. The other two sections of the book are devoted to the various methods of fabricating these two classes of products.

The book is of a convenient pocket-size and is ring bound to open flat at any point. In addition to a list of contents, the book contains four index tables, one each for illustrations, formulas, and tabular data, as well as a 17-page itemized cross index. Moreover, the book includes more than 230 illustrations, 22 tables, and 32 formulas.

The book is available without charge to engineers, designers, plant personnel, and other individuals addressing requests on their company letterheads.

Everyone Profits Through Grinding Wheel Standardization

A special report prepared in collaboration with the Grinding Wheel Institute

By Fred W. Vogel

MASS production methods of fabrication would be exceedingly difficult, if not actually impossible, without standardization of parts. Standardization in industry also makes possible the more continuous employment of personnel because manufactured output may be placed in stock rather than to merely meet sporadic or seasonal demands for specialized orders. It permits production to function with the least amount of inventory, as well as aids in reducing the cost of production in many other ways.

All of us are continually aware of the advantages we enjoy from the standardization of such commonplace items as bedding, light bulbs, automobile tires, to mention only a few. Similarly, in the less familiar but equally important field of perishable tools, abrasive wheel manufacturers have worked unremittingly in the past for the establishment of standards which, although perhaps not widely known, have nevertheless played a vital part in making it possible for the consuming industries to produce better quality products at less cost.

Currently, manufacturers of grinding wheels are once again renewing their efforts to bring about more complete standardization in the industry. Tremendous benefits are visualized from a further reduction in the number of wheel varieties now available.

Behind every move toward greater standardization is a move toward improved safety. This consideration is mandatory in view of the large number of grinding wheels in daily use throughout the consuming industries. The grinding wheel industry, in fact, is taking advantage of standardization changes to replace wheels of safe design with those of even greater intrinsic safety. In the last analysis, a new standard wheel is either accepted or rejected on the basis of whether or not it is safer in use than those it replaces, or safer than any other which modern grinding wheel technology currently can devise.

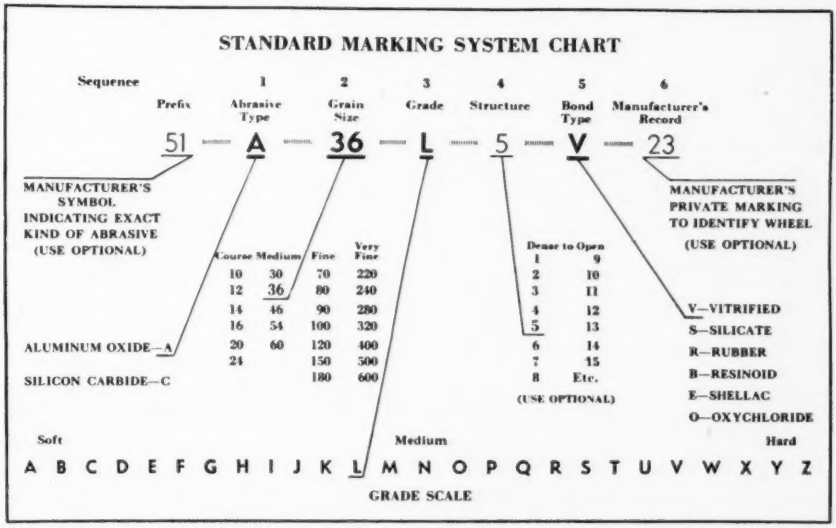
Design considerations in the current standardization program concern themselves mainly with two things: (1) Grain size; (2) Shape and size of the grinding wheel itself.

Considerable work has already been done in standardizing these two basic wheel specifications. Future progress

in this direction will stem from standards which have been carefully developed by the industry and then accepted for publication and distribution by the Commodity Standards Division of the National Bureau of Standards of the United States Department of Commerce.

excess of 750,000—and was growing fast. It was this overwhelming number of different grinding wheel sizes and shapes which at that time forced the industry to launch its first all-out standardization program.

Through the adoption of standard shapes recommended at that time a



Grain size standards which have been adopted provide for a uniform classification in terms of the number of meshes per linear inch of screen. These standardized grain sizes aid substantially in the production of uniform finishes, consistently high quality grinding wheels turned out at continuously maintained high levels of production, and stabilized methods or operating practices.

Probably the most dramatic progress of all has been made in standardizing wheel shapes and sizes. Prior to the adoption of standard shapes in 1926 the total number of possible varieties of grinding wheels was in

reduction to approximately 250,000 wheel varieties was accomplished. While it might seem that the existence of some 250,000 varieties scarcely represents standardization, this is actually a small figure compared to the astronomically large number of wheels which conceivably could be made. Moreover, it must be remembered that standards defeat their purpose unless they encompass the widest practicable range of needed wheel sizes and shapes.

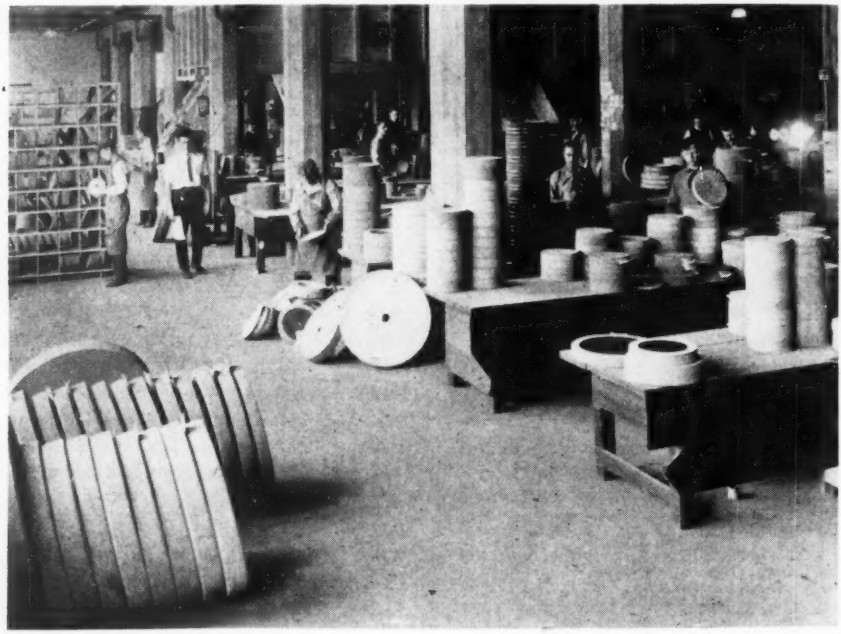
Chaos springs readily from the situation where no standards exist, with the result that each grinding wheel manufacturer sets about making a

different wheel for the same application. This is why the industry is striving to make one wheel do the work of many—providing it does the work as well as any of the replaced wheels—and why duplications are being eliminated wherever they are discovered. But the reduction process does not, and cannot, involve cutting down the number of wheel varieties to some arbitrarily determined number at the expense of failing to meet the demand for wheels whose design is unique for some justifiable production reason.

Actually, standardization is a continuing process—a job without end. This is true because through the years many wheel types have become unnecessary and were dropped, while new industrial applications have forced designers to create entirely new wheels which had to be included among existing standard types. But standardization hasn't yet reached the point where the dropping and adding of types to meeting changing needs is the only function of the grinding wheel industry. Much solid work of a fundamental nature still remains to be done.

Simple comparison is the basic method by which a multiplicity of wheel shapes was reduced to the smallest number feasible for present needs. A complete list of existing

This photograph of a grinding wheel company inspection room, taken over a quarter century ago, shows a number of wheels which are now obsolete because of the industry's standardization program. It is reminiscent of the way users as well as manufacturers once handled and stocked grinding wheels, and is also an excellent example of how *not* to stock abrasive wheels. Piling straight wheels like pancakes is considered poor practice by today's standards; correct method is to store them vertically on edge in racks with an individual compartment for each wheel.





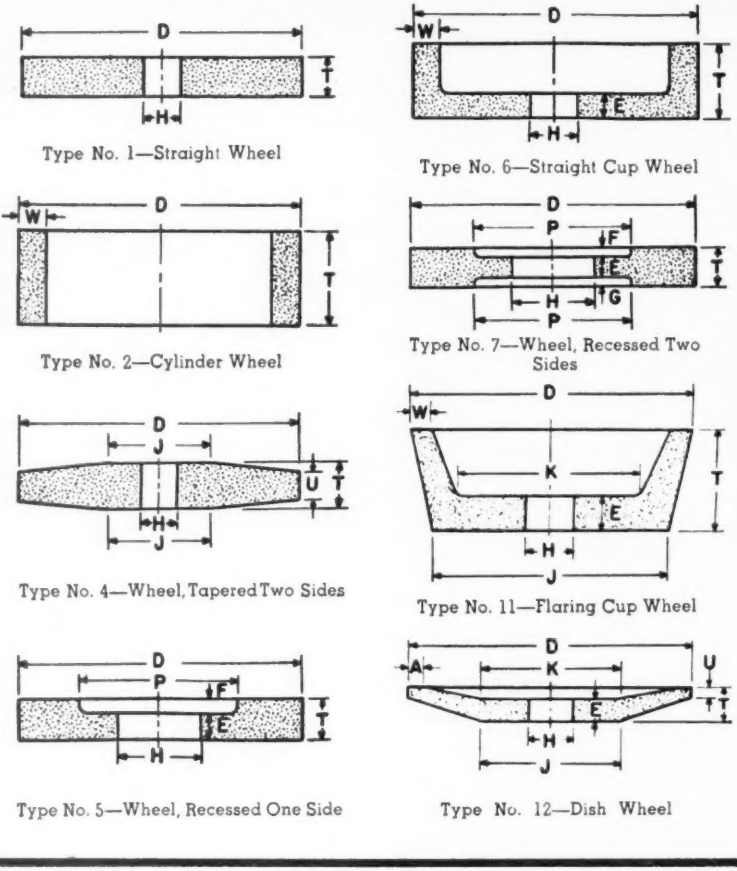
Standard shaped wheels are rested or stacked, segments are stored on top of one another in boxes and small wheels or mounted points are kept in drawers, boxes or small bins. Standardization of sizes and shapes, as well as composition, enables this grinding wheel user to store all types needed in a much smaller stock room than otherwise would be required. Saving valuable storage space is one of the most important benefits resulting from standardization. Because the Grinding Wheel Institute recognizes that still greater refinements are possible, the standardization program is carried forward today as energetically as ever. Illustration courtesy Carrier Corporation, Syracuse, New York.

sizes of each given type of wheel was compiled. These were checked against each other by a layout plan where sizes of a given diameter and similar shape were drawn over each other.

In one instance, layouts of twenty-two 6 in. dish grinding wheels were examined and found to be so similar that virtually any one of them could do the grinding work of any other of them.

These twenty-two varieties were reduced to just two sizes and shapes. This was possible because none of the design variations had any bearing on the engineering principles involved in their intended grinding applications. The two wheel designs finally developed did every job just as well as any of the twenty-two wheels which were made obsolete.

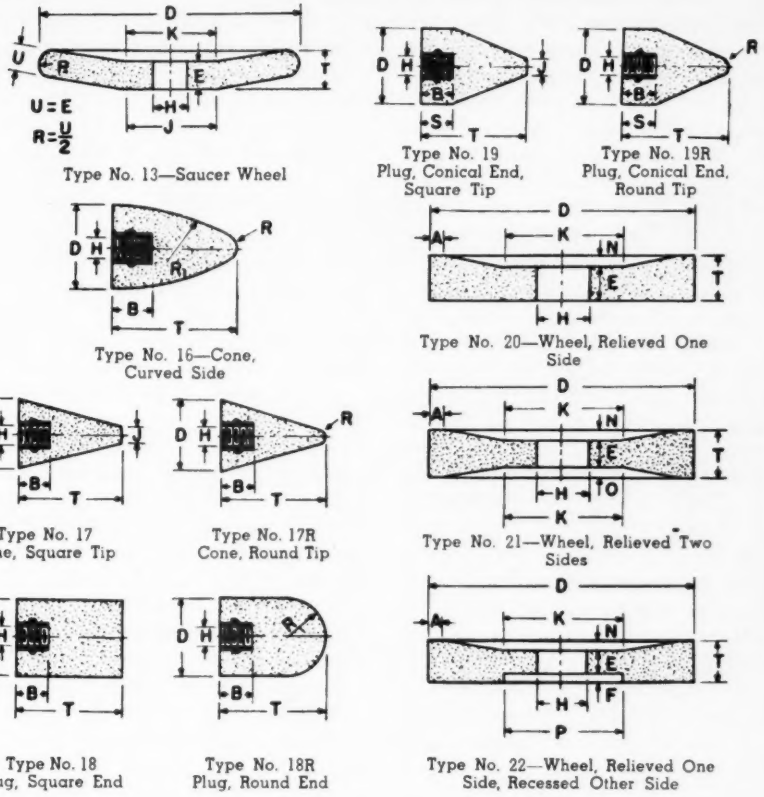
The benefits of standardization can be even better appreciated by visualizing the problems which would result if no standards were available. For example, at the present time there are 185 standard shapes and sizes of mounted wheels and points. They are subdivided into the following groups: Twenty-six large formed wheels identified by "A" numbers, such as A1, A2, and so on; fifty-four small formed



The shape types shown above describe the vast majority of grinding wheels in use today. The 19 outlines Standards and The American Standards Association. These type numbers, used with dimensions completely and accurately the shape and size of any standard grinding wheel without need of a detailed but also substantially reduces chances of

wheels identified by "B" numbers, such as B41, B42, and so on; and the balance of 105 plain, cylindrically-shaped wheels of various sizes designated as "W" shapes, such as W141, W142, and so on.

Since many of the "A" and "B" shape wheels are rather intricate in design, it would be extremely tedious and difficult for the purchaser, for example, to write individual specifications for each item ordered without inviting error on the part of both consumer and supplier. Standardization,



were adopted by the Grinding Wheel Institute, working in cooperation with the National Bureau of responding to applicable letter symbols shown on the sketches above, make it possible to describe com- drawing. The system not only greatly simplifies ordering and record-keeping for manufacturer and user, error in describing wheels.

through its universally accepted system for marking and designating grinding wheels, assures the purchaser that he will get the desired wheel from any manufacturer—at any time—and without error, merely by providing the mounted wheel shape number and mandrel specification.

Standardizing grinding wheel shapes and sizes has brought to abrasives users these advantages:

1. **Reduction of Inventory.** Prior to the establishment of standards, users of wheels were confronted with the

problem of carrying many special shapes and sizes in their stocks for special applications. Not only was there the warehousing burden of these large stocks, but considerable time was wasted in constantly—and needlessly—changing grinding wheels for every change in production requirements. The standardization which reduced the number of standard shapes almost in the ratio of 3 to 1 offered the user more adaptable wheel shapes and sizes which could be used for the largest number of operations on the widest variety of machine equipment within the scope of their intended use.

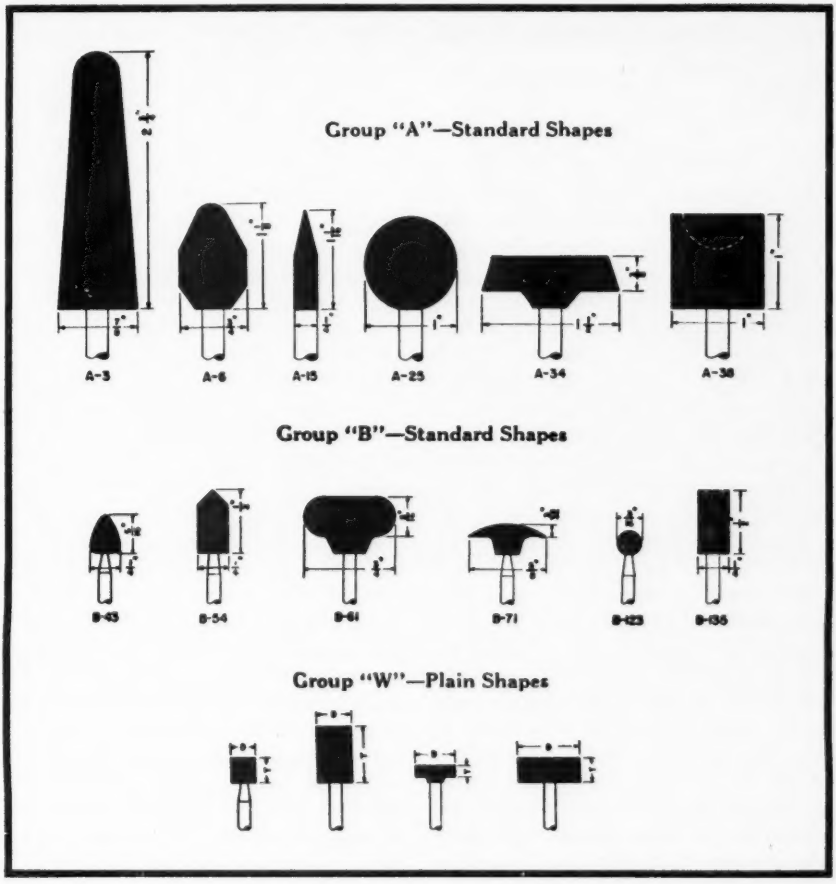
2. **Better Quality Products.** The user of grinding wheels benefited further as abrasive manufacturers began to specialize in the standard shapes and sizes. Wheels of a given specification were made in larger lots, which made it possible to maintain more accurate control of abrasive components. Dimensional tolerances also were narrowed and finish practices became more standardized. All of this resulted in the production of grinding wheels that were uniformly efficient from lot to lot—an absolute necessity in supplying industries where it is imperative to maintain production schedules on long runs of identical parts.

3. **Cost Reduction.** The efficiencies resulting from standardization not only inspired the development of better quality products but also reduced costs. With fewer items to manufacture the abrasive wheel producers devoted more time and energy to refinements of their products. This provided users with wheels whose grinding characteristics had been completely determined and which gave maximum productivity at the lowest possible cost per unit ground.

4. **Interchangeability.** The advantage enjoyed by the abrasive wheel user in being able to use many of his grinding wheels interchangeably on similar machines is derived from standardization programs carried on concurrently by wheel manufacturers and machine builders. It is not uncommon today to find centerless grinding wheels 24 inches in diameter being used down to 20 inches at which point they are transferred to other centerless machines and used down to the flange diameter, thereby securing maximum use of the abrasive. Similarly, snagging wheels originally 24 inches in diameter may be used down to 20 inches in diameter, and then transferred to a smaller swing frame grinder to complete their useful life. Such dollar saving interchangeability is made possible only through standardization of wheel thicknesses and arbor hole sizes.

5. **Improved Deliveries.** Modern industry tends strongly to operate on the basis of minimum inventories, and therefore depends heavily on an uninterrupted flow of readily available tools and raw materials to maintain production. The large scale use of standard specifications make it possible for customers' abrasive requirements to be anticipated more readily by the abrasive manufacturer. The result is that standard items can be stocked for immediate delivery, and less of the customer's capital need be tied up in stocking special items which can only be made up on order and requires longer time for delivery.

6. **Ease of Ordering.** One of the most recent phases of standardization is the development of a system of positive identification and specification of wheels and rubs used in the surfacing



Standard mounted wheels and points differ from standard grinding wheels in that they are mounted (usually cemented) on spindles. The three groups of standard shapes and sizes are shown above. Group "A" differs from Group "B" in spindle diameter, and also generally as to size, both sizes and spindles in Group "B" being smaller than those found in Group "A". There are four plain shapes, with both small and large spindles, and these are shown in Group "W" above. As with standard grinding wheels, the type number and appropriate dimensions are all that is needed to completely describe the shape and size of any standard mounted wheel or point.

of stone, terrazzo and concrete floors. Each standard size and shape has been assigned a specific code number which identifies the complete size and shape specifications for the item, and designates it as intended for use on the equipment of a given machine manufacturer. Numbers are prefixed by the letter FW (floor wheel), FR (floor rub) and HR (hand rub). Formerly, each abrasive manufacturer used his own coded identification of these commodities. Now, however, the user can by specifying a standard shape such

as an FW26 be assured of receiving the wheel he wants, regardless of the source of supply.

7. **Safety.** A major consideration of grinding wheel users is safety in use. In standardizing grinding wheel shapes, the industry not only has given careful attention to this factor, but has also cooperated energetically with The American Standards Association in the formulation of detailed recommendations for safe grinding practices. For example, Type 6 cup wheels are specified with adequate thicknesses of wall and back. Similarly, Type 1 vitrified snagging wheels are specified with arbor holes of the proper size to minimize danger of rupture at stub diameters. The designs of all wheels sizes and shapes listed as standard are carefully reviewed and selected from this safety standpoint.

Realizing the importance of a uniform system of identifying grinding wheels, the Grinding Wheel Institute has established a standard method which uses six basic elements common to all abrasive wheels, regardless of the manufacturer. Since a grinding wheel cannot be properly designated in fewer than these six variable elements, it is clear—in view of the many possible combinations—why every effort to standardize and minimize sizes and shapes must be made. The system for marking wheels is shown in Table 1.

The first marking position at the left of the table indicates the abrasive of which the wheel is made, such as aluminum oxide (A), or silicon carbide (C). A prefix letter or number sometimes is used here to indicate a modification of the basic abrasive type.

The second position is a number of meshes per linear inch of screen indicating the size of the particle of abrasive grain used in the wheel.

Third position is a letter (A to Z, soft to hard) which specifies the grade or the degree of tenacity with which the bonding material holds the grain particles together in the wheel. This position designates the "hardness" of the wheel, and is not to be confused with the hardness of the abrasive grain itself.

Fourth position in the standard marking system for grinding wheels tells the structure or grain spacing (0 to 16, dense to open.)

Fifth position employs a letter to designate the bond type. V means vitrified; S, silicate; R, rubber; B, resinoid; E, shellac; and O, oxychloride.

Sixth position signifies the maker's detail of manufacturing and its use is optional. It may be used by him for any purpose, and usually refers to a modification of the bond. It also serves to identify the manufacturer.

By this means it is possible to recognize the elements contained in a grinding wheel, providing an accurate description for purposes of ordering, stocking and allocation of the correct abrasive material for production purposes within the users' plant. The specification number is stenciled on each wheel by the manufacturer.

Useful and valuable as it is, this standardization system applies only to marking and does not necessarily mean that abrasive wheels of different manufacturers which are similarly marked will always produce identical grinding results.

The Grinding Wheel Institute has made available the following pieces of literature which deal with grinding wheel standardization and the safe



This modern grinding wheel stock room shows the beneficial effects of the standardization program of the Grinding Wheel Institute. Odd-shaped wheels are conspicuously absent, their grinding tasks now being done as well—or better—by conventionally-shaped wheels. Each wheel's composition is clearly marked in the standard system consisting of six principal letters and numbers which tell type of abrasive, grain size, bond, and other important specifications—which are fully explained in the accompanying illustration of the marking system. Storing grinding wheels properly, as shown above, protects them from chipping or breakage and aids in locating them quickly. Illustration courtesy Carrier Corporation, Syracuse, New York.

and efficient use of grinding wheels:

1. Grinding Wheels—Standard Shapes and Sizes of Grinding Wheels —(Simplified Practice Recommendation R45-47 National Bureau of Standards.) This booklet sets forth industry standards for grinding wheel shape types with detailed dimensions. All wheels listed also are classified according to basic uses.

2. Abrasive Grain Sizes—Simplified Practice Recommendation 118-50 (National Bureau of Standards.) This booklets lists the allowable limits for the sizing of aluminum oxide and silicon carbide abrasives both for grinding wheel manufacture and for polishing purposes.

3. American Standard Safety Code for the Use, Care and Protection of Abrasive Wheels (American Standards Association.) ASA B71-1947. The scope of this publication includes rules and specifications for protection hoods, flanges, chucks, and revolving cup guards and rules for the proper storage, handling and mounting of wheels. It gives minimum arbor sizes and maximum safe operating speeds of grinding wheels.

4. Specifications of Segments used in Chucks (Grinding Wheel Institute, 2130 Keith Building, Cleveland 15, Ohio.) This booklet contains diagramatic sketches of chucks showing the holding mechanism as well as complete

dimensions for all standard shapes listed.

5. Mounted Wheels and Points, Safe and Efficient Operation — Critical Speeds (Grinding Wheel Institute.) This booklet lists all standard mounted wheel shapes giving general rules for safe operation together with tables of critical speeds.

6. Disc Grinding—Safe Rules and Methods (Grinding Wheel Institute.) The purpose of this booklet is to describe the special features of disc grinding and to illustrate recommended practice with respect to mounting procedures and the use of safety techniques.

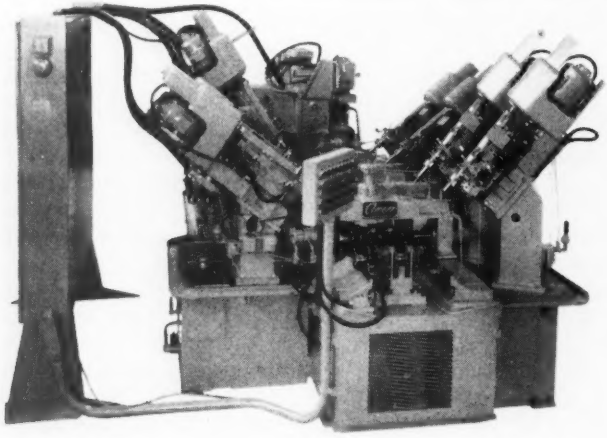
7. Handling Storage and Inspection of Grinding Wheels—Safe Rules and Methods (Grinding Wheel Institute.) This booklet presents proven methods and rules to follow for the safe storage, handling and inspection of grinding wheels.

8. Mounting Techniques for Wheel Sleeves on Cylindrical Grinding Machines (Grinding Wheel Institute.) 2P-3-52. This publication deals exclusively with the elimination of wheel breakages on cylindrical grinding machines by recommending the specific amount of "wrench pull" for the operator to use when mounting wheels on each of the more common types of cylindrical grinding machines.

9. Safe Speeds for Grinding Wheels (Grinding Wheel Institute.) 1P-42. This booklet based on the rules in the ASA Safety Code B7.1-1947 discusses established rules governing the proper speeds to be used for safe grinding wheel operations, touching on wheel strength, peripheral speeds and the overall efficiency of low safe speeds in

Tractor Crankshaft Driller

DESIGNED and built by The Avey Drilling Machine Co., Cincinnati 1, Ohio, to drill lubrication holes in tractor crankshafts, the transfer crankshaft drilling machine illustrated herewith employs all Avey units, including Torquematic control in order to eliminate drill breakage. Transfer of the crankshaft through the machine is automatically effected through hydraulic indexing. The machine is said to have a production rate of approximately 60 crankshafts per hour.



respect to reduced wheel breakage.

10. Portable Grinding Machines, Safe and Efficient Operation (Grinding Wheel Institute.) 4P. The purpose of this booklet is to outline the conditions that are likely to cause trouble and to provide information regarding the safe use and maintenance of Portable Grinding Machines for both the workman and the Supervisor.

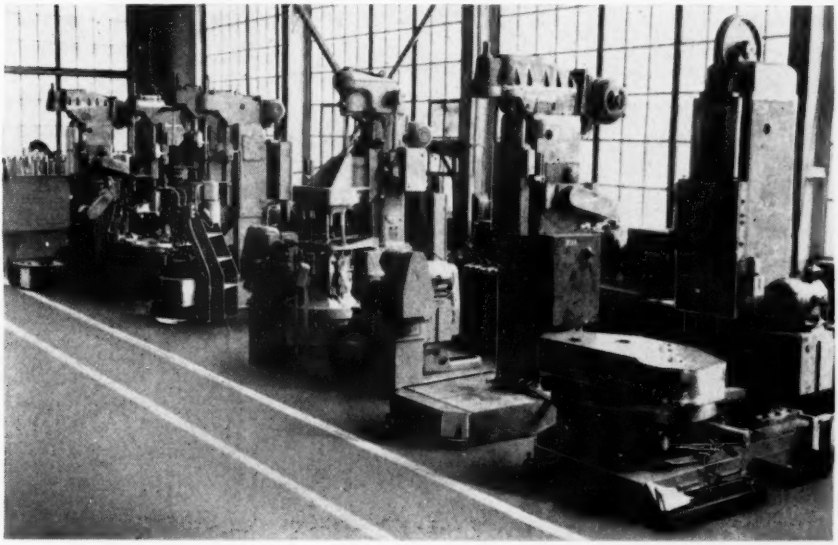
11. High Speed Grinding Machines —Heavy Duty Maintenance of Swing Frame and Floor Stand Machines— Large Hole, Organic Bonded Wheels (Grinding Wheel Institute.) This booklet outlines in general terms the conditions largely responsible for trouble if not corrected, and supplies information needed to facilitate proper inspection and maintenance of that portion of the equipment that affects the safety of the wheel.

Meehanite Casting Film

A thirty-minute sound slide film entitled "Meehanite Castings Serve All Industry" has been prepared and is available from the Meehanite Metal Corp., New Rochelle, N. Y. The film is designed for showing to engineering groups, societies, employee meetings, or others interested in the use of high property iron castings for component parts. Available on a loan basis at no charge, the film contains 43 frames illustrating applications in nearly every major industry and is accompanied by descriptive narration.

"Drillmasters" for Export

THE accompanying illustration shows a battery of "Drillmaster" precision drilling machines destined for shipment across the U. S.-Canadian border by the manufacturer—Standard Machine & Tool Co., Ltd., Windsor, Ontario.



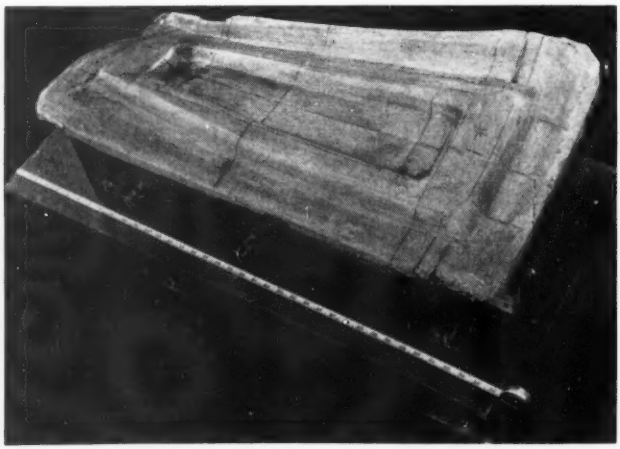
Constant Tolerance Forming Dies

Reduction in grinding and polishing time possible with new molding method.

By Gilbert C. Close

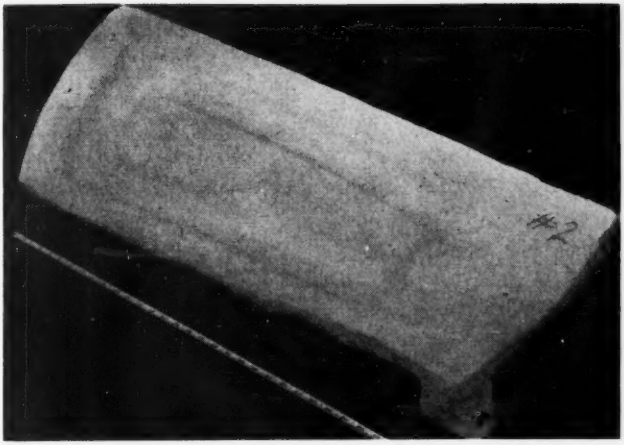
THE demand for closer tolerance production, especially as it pertains to the thousands of sub-contractors producing precision parts for the aircraft industry, is resulting in many modifications of old production processes that promise a lasting benefit to industry. One such modification is now going on in drop hammer production. This modification, in shops where it has been adopted and put into practice, is resulting in the production of drop hammer forming dies of more constant dimensions and closer to blueprint tolerance requirements than were possible to produce using the older and more conventional drop hammer tooling techniques. The practice eliminates to a large extent the blue block grinding of cast dies, and results in substantial savings in time and die costs.

Specifically, this modified practice involves the use of an expansion plaster for making drop hammer die patterns, and a means of controlling die metal cooling so that shrinkage is confined to predictable limits. Final and total shrinkage of the die metal, both dimensionally and in warpage, is made to conform almost exactly to the expansion characteristics of the plaster pattern. This offsetting of die metal shrinkage (as high as 0.10-0.15 inch per foot with Kirksite) by the use of oversize



Plaster mock-up with templates made from lofted lines.

Cast from mock-up (standard scale) from which blue block and standard plaster pattern is made.

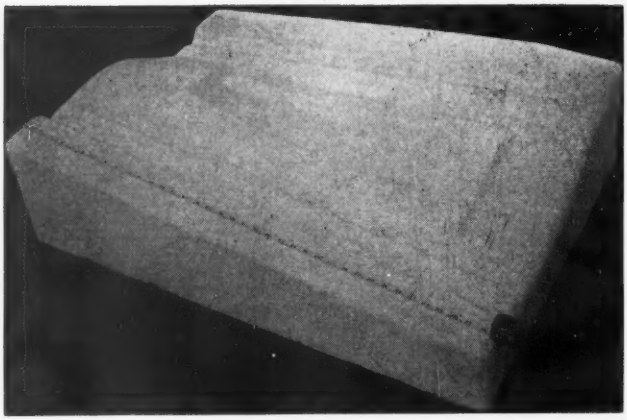


patterns results in tools of constant tolerance and conforming within narrow limits to blue block size requirements.

A program to investigate this method of constant tolerance drop hammer die production was instigated several years ago by the Production Research Division of the Air Materiel Command. Facilities and personnel at Armour Research Foundation of Illinois Institute of Technology were employed to iron out the problems in-

Standard pattern rammed up, and medium high expansion plaster being poured. The plaster mix is carefully added to the sand mold cavity as shown in order to prevent disturbance of the sand. The sand mold is compacted to a density somewhat less than in ordinary foundry practice. This degree of softness permits the expansible plaster to expand to desired dimensions.

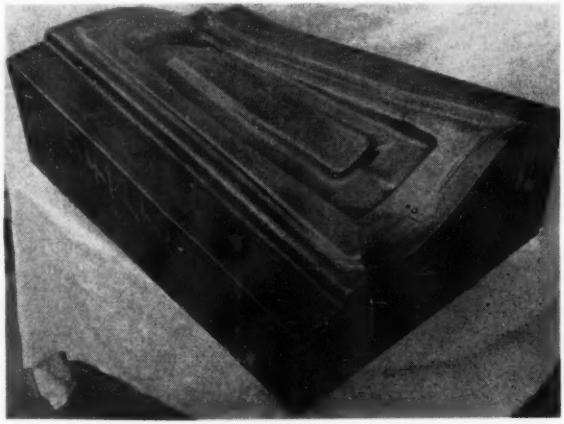




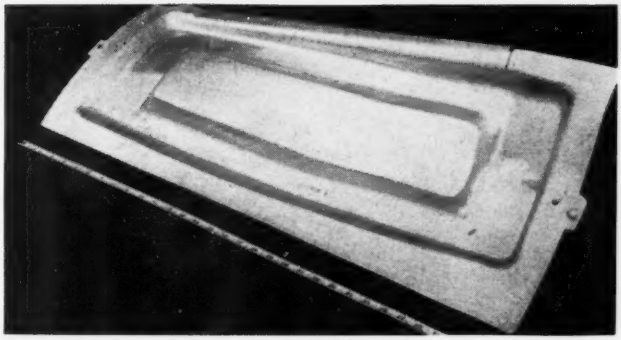
Medium high expansion plaster pattern after being withdrawn from sand and cleaned up ready for reramming and pouring zinc alloy.

volved. As soon as workable techniques were established several large aircraft companies, including the Glen L. Martin Company and Northrop Aircraft, Inc., adopted the new techniques and refined them to meet their peculiar requirements. This article deals with the techniques now employed at Northrop Aircraft where, under the direction of Roy L. Venable, foreman of the plaster shop and foundry, and Keith F. Finlay of Process Engineering, constant tolerance drop hammer die production has been improved to a point where it is possible to produce 4½-foot long Kirksite drop hammer dies with an overall dimensional fidelity within 0.020 in. of blueprint requirements prior to blue block grinding.

It is evident that the production of close tolerance forming dies is based on (1) close tolerance patterns, and (2) the use of die metal having predictable shrinkage characteristics. One without the other will nullify the best efforts. It is further evident that as shrinkage is a common physical characteristic of all die metals, production of a die to blueprint dimensions will require the use of a pattern just sufficiently oversize to offset this metal shrinkage. The third factor involved that affects dimensions, ie., warpage, is substantially controlled along with controlled die metal cooling to obtain constant shrinkage char-



Zinc alloy die ground in with blue block.



Sheet metal stamping proven back to mock-up and blueprint requirements and found to be within blueprint tolerance.

acteristics. These are the fundamentals on which the Northrop program is established.

While both medium and high expansion plasters are now available, the high expansion variety is dimensionally unstable after setup and the pattern must be used within a few hours or size changes will occur. The medium expansion variety, once set, retains its expanded dimensions indefinitely and was selected by Northrop engineers for their die casting work. This plaster is characterized by high strength, non-weeping, consistent expansion, and dimensional stability after the desired expansion has been obtained. It is sufficiently strong after setting to be used as a pattern.

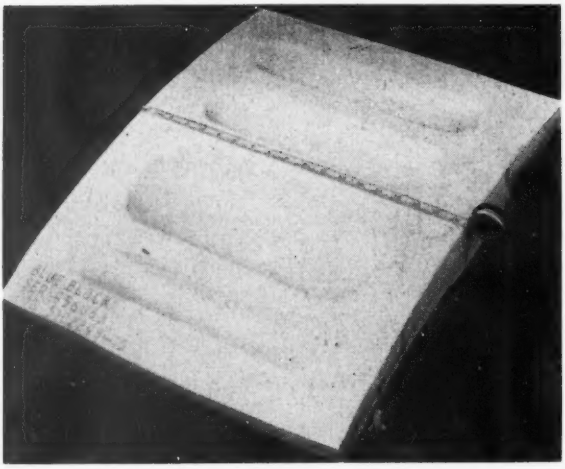
To obtain constant and desired expansion characteristics, the water-to-plaster ratio must be carefully controlled during mixing. This is best achieved by weighing each. The following mix table is used in the Northrop shops:

Expansion Plaster (lbs.)	Water (lbs.)	Expansion Obtained (inches per foot)
100	42-44	0.120
100	40-42	0.130
100	38-40	0.140

The expansion ratios shown above apply to casts that are a minimum of 4 to 5 inches in depth, and the water is used cold. Use of hot water during mixing will increase expansion from 10 to 15 per cent.

In mixing, the plaster is strewn into the water as evenly as possible, then allowed to soak for a few minutes. After this soaking, very small batches are finish-mixed by hand. This involves vigorous working of the plaster and water until a smooth, lump-free mass is obtained. For mixes of over 10 pounds, a drill motor with a four-inch mixing disc attached is employed. While seldom used, it has been demonstrated that for very large batches, a planetary action mixer with a bar-type agitator can be successfully employed. The heavier mixes will not flow freely and must be forced or tamped into place over the master pattern or mold surface. It is also possible that some holes or voids will occur in the face of the expansion cast. These voids should be filled after the cast has reached its maximum expansion.

In using expansion plaster, some means must be provided to determine the expansion of the pattern as it sets. At Northrop, the plaster mock-up or master is constructed in the usual manner, using a nonexpanding and conventional plaster. As the gypsum

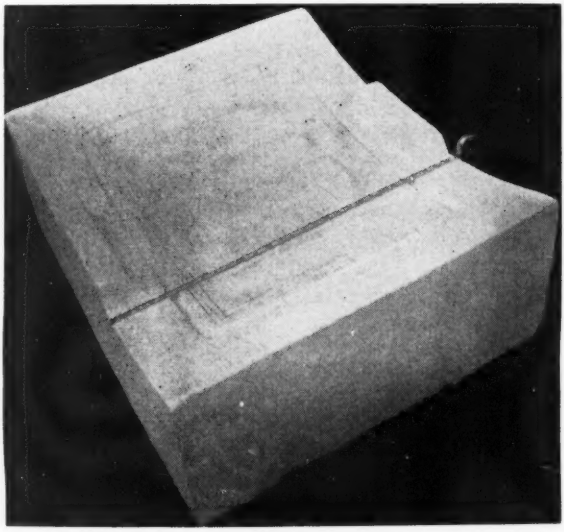


Plaster cast from plaster mock-up fuselage section. Nodes were built up independently per blueprint. This standard scale replica is also used as a blue block to finish die.

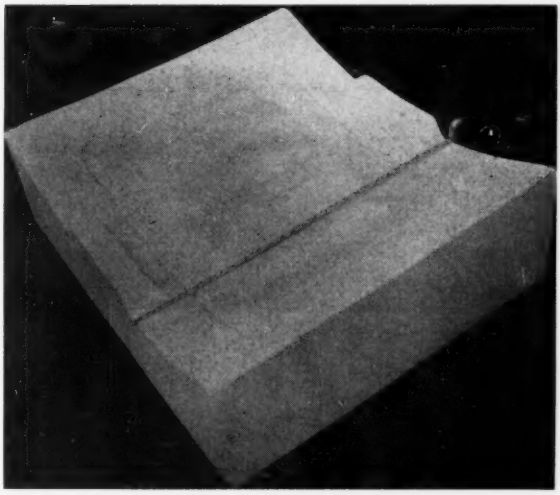
cement used in this master hardens, the surface is smoothed and trim lines for the part are scribed in the surface. The entire surface of the master is then given two coats of a good grade clear lacquer. After the lacquer has dried, the surface of the master is then further prepared by coating it with a parting compound composed of stearic acid and kerosene.

The next step is to make a splash cast over the master original model. Here again non-expanding plaster is used, and the splash cast is made from 1½ to 2 inches thick and reinforced with Sisal Fibre. This cast is made in a conventional wood retaining frame around the master model. At this point a drill bar template is placed on the splash cast and two holes are drilled into the plaster. Dowels are then inserted into the holes so that they will be subsequently transferred to the expansion plaster cast and may be used to measure expansion during setting. The splash cast is then set up, along with a flask, both of which are given the usual coating of lacquer and stearic acid before pouring the expansion plaster.

The initial expansion plaster set oc-



Standard scale pattern made from replica from plaster mock-up. This pattern is rammed up in sand and medium high expansion plaster is poured into resulting sand mold cavity.



Medium high expansion pattern after expansion has taken place. Pattern is removed from sand, cleaned up, rammed and zinc alloy poured into sand mold cavity.

curs soon after the pour losses its water gloss. The cast will become slightly warm when the final set occurs. At this point the dowels in the drill holes (which must be long enough to protrude up through the expansion plaster cast) are removed so that the expanding cast can be removed from the splash cast. The expanding cast is then placed on a flat and greased surface so that expansion can continue without surface bind and drag. Experience has proved that placement of the expansion cast on a dry, ungreased surface at this stage of production will hamper expansion enough to affect final dimensions.

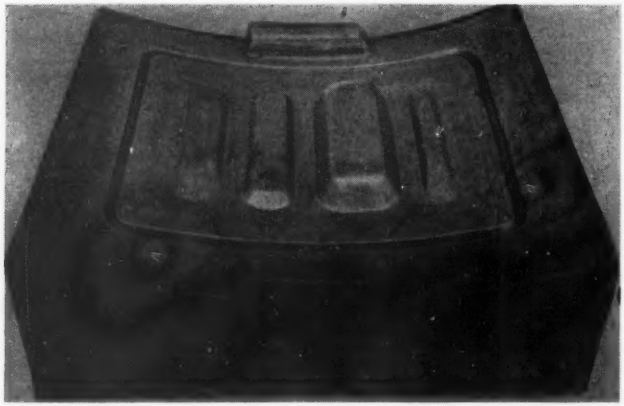
Expansion is checked during the growth of the cast by trammel points which have been preset to the shrink dimension gauge or drill bar. By using this standard dimension, the need for a shrink scale is eliminated and the possibility of error minimized.

Final set of the expanded pattern (standardized at 0.135 inch per foot for Kirksite) occurs in from 2 to 2½ hours. The expanded pattern is then given two coats of clear lacquer, dried, then coated with the usual stearic acid-kerosene parting compound. The next step is to take a splash cast from the expanded pattern using a nonexpanding plaster material. The foundry pattern is then made against this splash cast using the same nonexpanding material. This pattern is then lacquered and sent to the foundry.

It should be noted at this point that the final foundry pattern conforms dimensionally to the expanded over-size plaster pattern, and that this over-size has been controlled so that it will just offset the controlled shrinkage of the Kirksite die metal as it cools.

When this final pattern reaches the foundry, it is provided with wood or steel flasks with trunnions. Bottom boards and follow boards are reinforced and made very rigid. The pattern assembly is then placed on a level space of floor to minimize the chance of cracking and warping, and to produce a level die top which will facilitate subsequent attachment of the die to the drop hammer. The mold is then tamped, gated, and prepared for pouring in the usual manner.

Theoretically, the Kirksite die metal

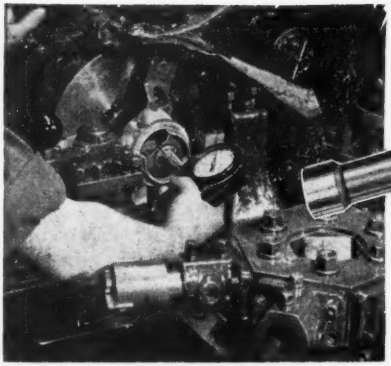


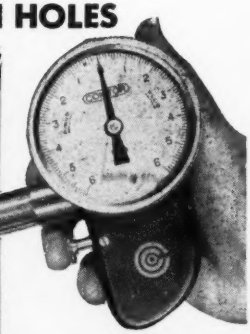
Zinc alloy die ground to conform to blue block.

used for drop hammer dies shrinks about 0.001 inch for each 50 degree drop in temperature from its freezing point at 700 degrees F. to room temperature. However, this theoretical shrinkage usually varies considerably when the metal is cast in an ordinary sand mold and subjected to the various degrees of stress concurrent with uncontrolled solidification. Minus controlled solidification, any advantage accruing from the over-size pattern would be offset by unpredictable warpage. Under uncontrolled cooling conditions, actual shrinkage of the metal upon cooling to room temperature has been found to vary between 0.080 and 0.140 inch per foot. This results in ex-

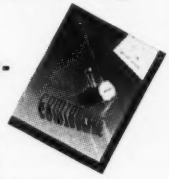
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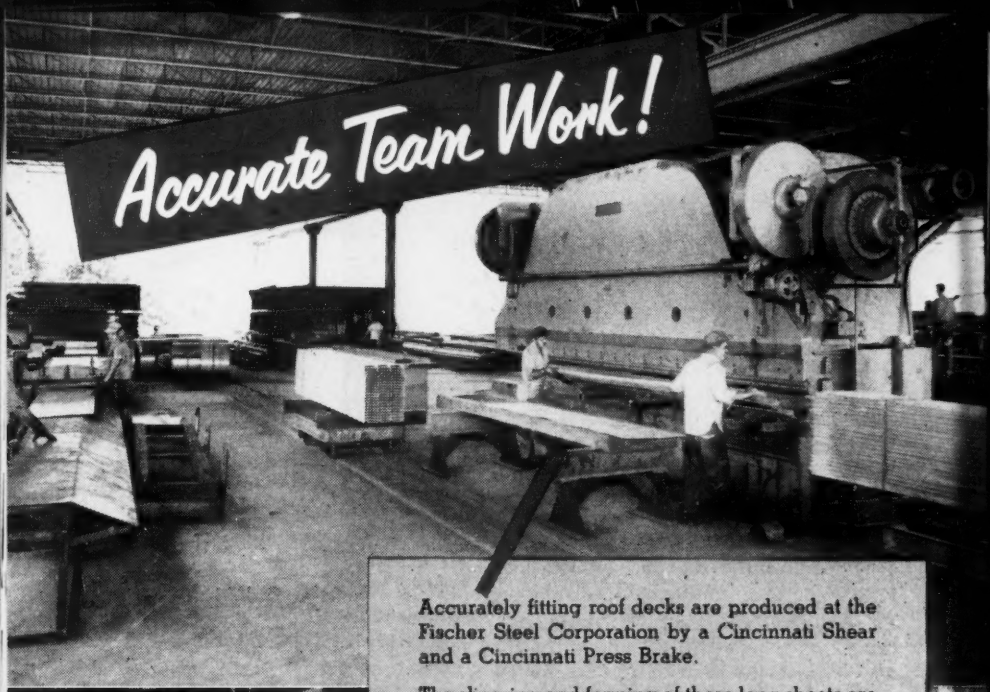


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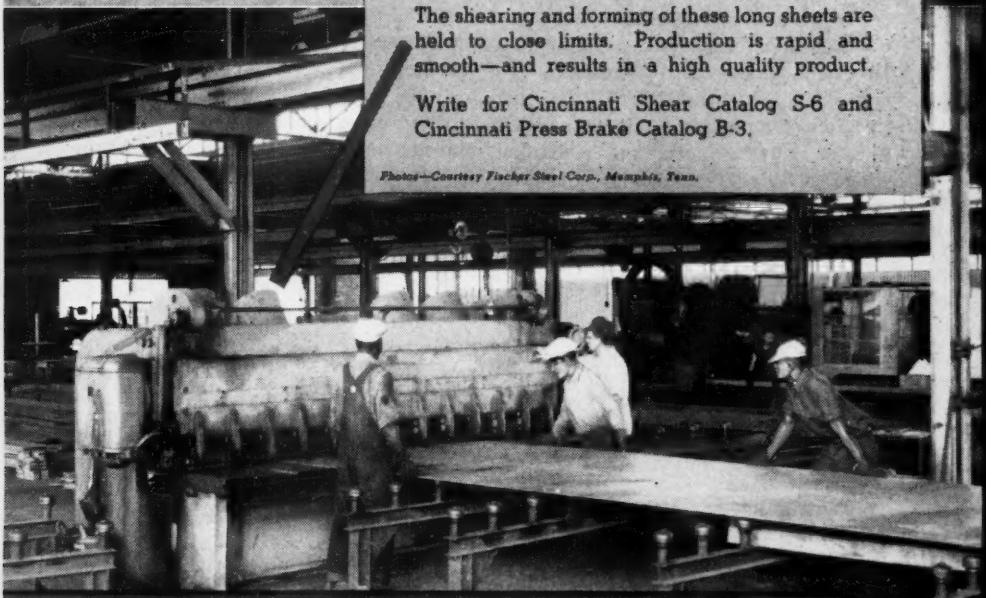


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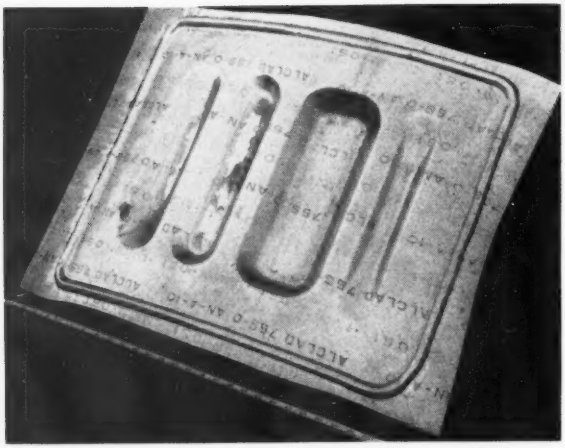
Photos—Courtesy Fischer Steel Corp., Memphis, Tenn.



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Sheet metal stamping proven back to mock-up and found to be well within blueprint tolerances.

cessive warpage and off-sizes which require many hours of blue block grinding to correct.

By using controlled solidification methods, it has been found possible to control shrinkage between 0.130 and 0.140 inch per foot. It is thus obvious that such shrinkage will conform very closely to the standardized 0.135 inch per foot expansion of the expanding plaster. Furthermore, the controlled cooling rate virtually eliminates warpage, and the as-cast die requires very little machining and polishing to bring it within blue block dimensions.

Several methods are used to control die metal cooling. At Northrop, the simplest method of all has been selected. In this method, the poured die is merely so well insulated that cooling rate is retarded sufficiently so that there are no appreciable temperture differences in the metal during its entire cooling cycle. This is accomplished by the application of asbestos sheeting around and over the cast die immediately after pouring. While completely effective, this method requires excessive cooling time, and current research is aimed toward a method of die chilling to produce center cooling that will conform in rate to that occurring on the air exposed surfaces.

Die chilling work at the Armour Research Foundation has centered around the use of flexible steam tubing incorporated in the sand mold and used to carry cold water to speed the center metal cooling rate. Flexible bronze steam hose is imbedded in a special high conductive facing sand at a distance of about ½ inch from the mold-metal interface. In most cases a single hose has been found sufficient, coiled back and forth as required to produce the proper cooling rate, but when very large dies are involved, several hoses must be used to prevent overheating of the cooling water during its passage.

The high conductive facing sand used at Armour Foundation is composed of three parts by weight of No. 00 Albany sand and one part by weight of 30 mesh commercial graphite. In preparation, the sand-graphite mixture is mulled 4 minutes, water added slowly, then mulled again for 4 minutes. The moisture content of this mixture must be somewhat greater than for straight sand due to the graphite fines introduced.

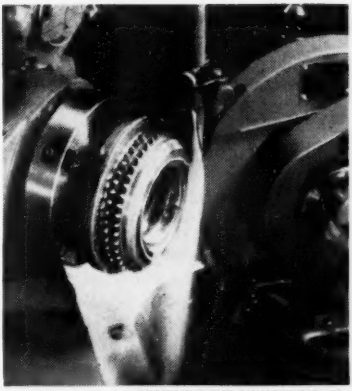
In placement, a layer of the facing sand is first rammed over the pattern

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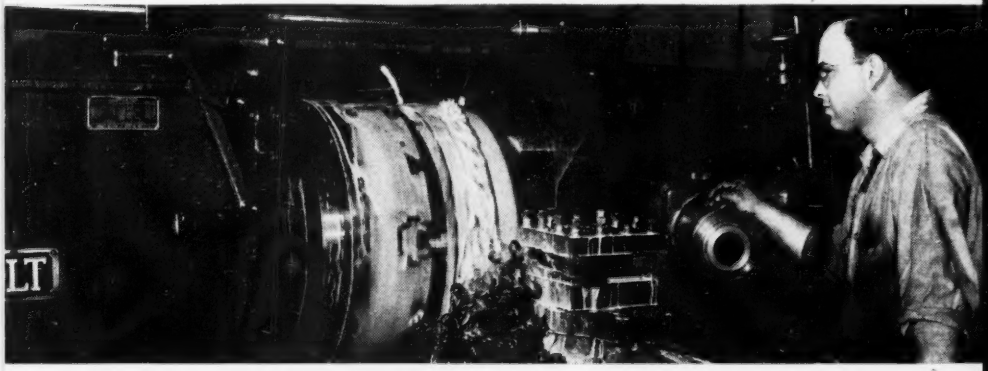
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MACHINE: Gisholt turret lathe, model 4L • Part: 20" press mold shell, 22⅝" O.D., 6" depth, 20½" I.D. • Operation: turning and boring rough forgings • Materials: 40 to 50 carbon steel • Tools: Firthite carbide • Feed: .012 at 31 rpm Cut: ½" to ¾" on O.D. and boring • Cutting Oil: 1 part S.E.C.O. to 10 parts water

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The traditional method of producing a die like this by making a pattern, casting and grinding to a blue block could require as much as a week. In contrast, Northrop Aircraft recently produced this die in less than 24 hours by the medium high expansion plaster method.

to a thickness of about ½ inch. The steam hose is then laid in place and held down by weights. For most die chilling purposes, parallel rows of hose about 2 or 3 inches apart will produce the desired chilling results. It is not necessary to locate the loops of the hose outside the flask. Another layer of facing sand is then rammed over the hose and the weights are removed. The mold is then finish rammed in the usual manner.

Just prior to casting, water is started through the hose at a relatively rapid flow rate to prevent overheating and formation of steam during its passage. When this type of mold chilling is used, recommended pouring temperature of the Kirksite is about 825 degrees F.

Northrop engineers have discovered that not all Kirksite dies require controlled cooling either by insulation or by chilling, while other types of dies may require both chilling and insulation. It depends upon the shape of the die and the ratio between the air-exposed surfaces and center metal. Small square dies under 18 inches square do not require controlled cooling, while larger square dies require mold chilling only, or insulation only. When long, narrow dies are being cast, both mold chilling and insulation are required to give best results.

All who have worked with this new constant tolerance technique are ready to admit that there is still much to be learned about it. At the same time, some of the results obtained to date have been outstanding. In general, a reduction of between 50 and 75 per cent in grinding and polishing time can be anticipated. As a specific example, with one 6000 pound drop hammer die being produced, foundry time requirements for using the controlled cooling method was increased from 5 to 6½ hours. But controlled cooling reduced normal warpage of the die from ⅜ to 1/32 inch. This reduced grinding and polishing time from 30 hours to 12 hours, resulting in an overall time saving on the finish die of 16½ hours.

It is obvious from the foregoing that the new techniques will not necessarily result in the production of parts of greater precision. Any die can be machined and polished to produce parts of any required tolerance. But by using the expanded pattern and controlled cooling method, a tremendous saving in die machining and polishing time can be realized. At the same time,

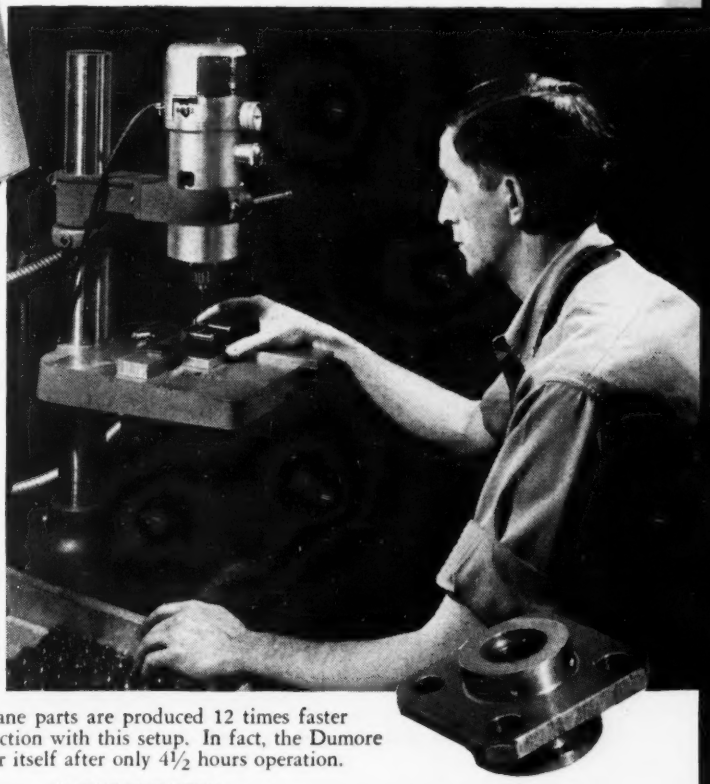
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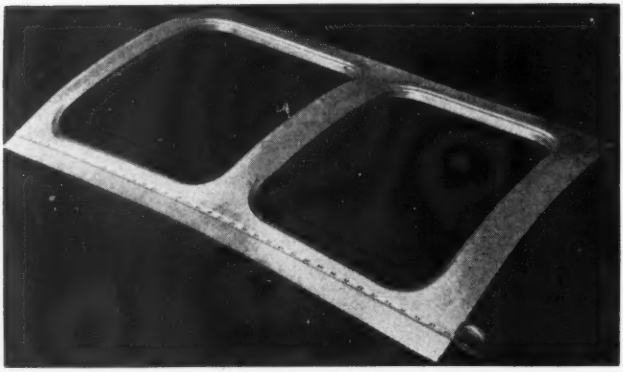
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This is a sheet metal stamping produced from the die shown in the illustration on Page 156.

in the production of parts requiring less critical dimensions, better overall dimensional quality would result.

This article has not attempted to explain in minute detail all phases of the new process. Rather, an attempt has been made to acquaint others with the new technique and the progress that has been made. It is food for thought to those who may be desirous of obtaining high drop hammer die precision with a minimum of machining and polishing time. Complete and highly technical information on the constant tolerance forming die production process can be obtained from the Armour Research Foundation.

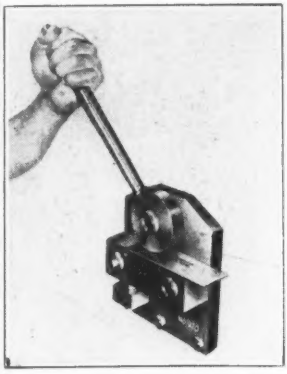
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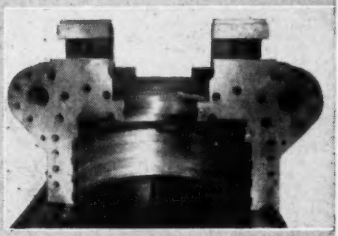
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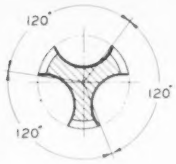
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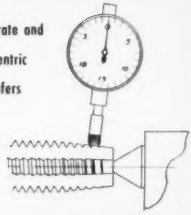
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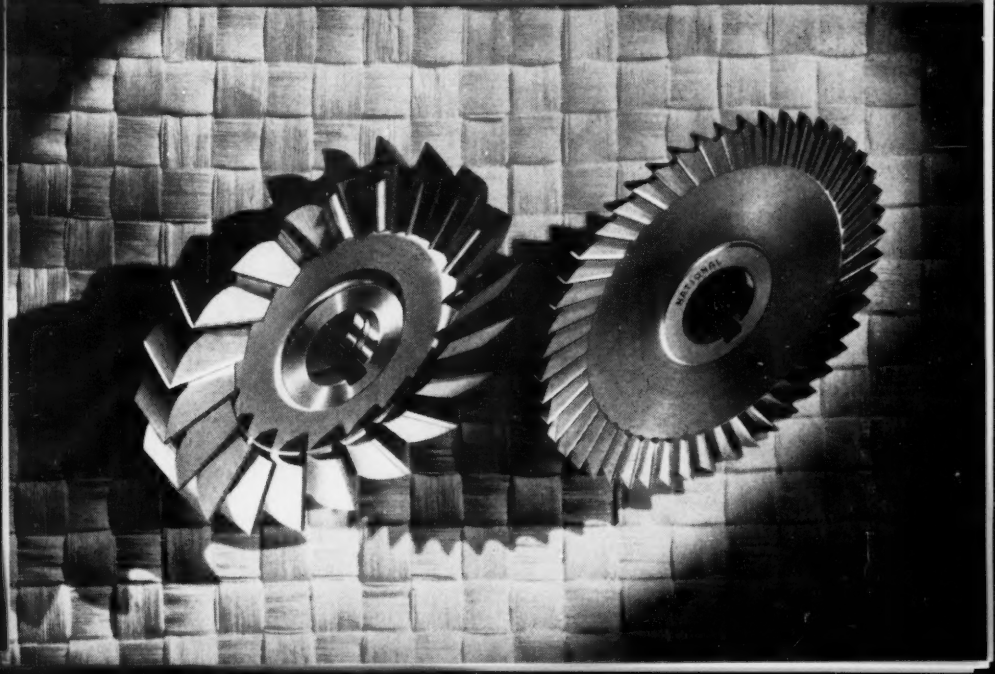
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The Case for the Tailor-Made Gage

In which the author tells how special gaging equipment meets the challenge of unusual workpiece design.

By C. W. KENNEDY

THE rugged individualism of the American product designer has about as much to do with the call for gages specifically designed for individual purposes as any other cause. Our engineers may imitate and copy considerably but they are reluctant to duplicate. They prefer to come up with something new, different, better. Designers spend little time looking up what has gone before. Historical research can be a musty chore compared to striking out on seemingly new, uncharted or unexplored paths.

Then too, competition usually requires a product to be different in some respect, and the patent situation enters in. You can scarcely imagine a General Electric engineer, for instance, exactly duplicating the Westinghouse drawing of a quarter horse power, motor end housing though, basically, there is no good reason for their not being interchangeable. So, when our geniuses bend over the board, the result is almost inevitably dissimilar in some respect to any other product of the same general kind.

However, there is no room here to



Fig. 1 — The button-shaped anvils regularly supplied by the manufacturer on the gage shown here were altered to chisel points in order to get up close to shoulders and detect excess fillets.

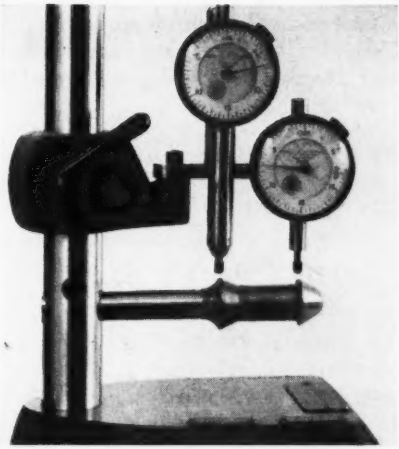


Fig. 2—The owner of the gage shown here had used it for a commercial product component and then had it changed over when he took on an ordnance contract.

philosophize profoundly over the activity of a designer's brain. We know the results are usually practical, often brilliant and occasionally weird. Those whose responsibility it is to hog these creations out of whole metal know what it means to devise tooling, jigs, dies, fixtures, machines and manufacturing methods for them. Seldom can the shop supervisor tell his people to machine the new widget exactly the same way they handled last year's gimmick.

Having tooled up and then shaped out a few of the new parts, their conformance with the print must be checked. The minute we make, we must measure.

Quite a catalogue of measuring apparatus has appeared on the market since the days of Eli Whitney—the steel rule, vernier caliper, micrometers, "Jo" blocks, indicators and diverse surface plate equipment as well as plug and snap gages. Somebody discovered the flush pin gage principle. We measure by air, electrically and by optics. Yet no one measuring instrument has been devised, despite considerable ingenuity on the part of gage makers, flexible and universal enough to keep up with all the shapes of parts product designers can contrive. Most of the time the machinist requires several different types of gages strewn about his work place.

In tooling up for the new part, it is possible many times to alter or add

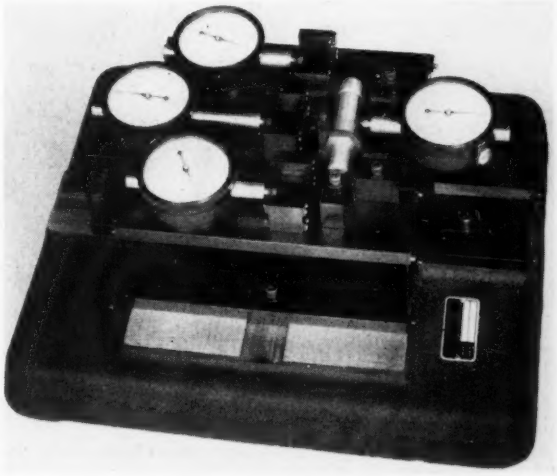


Fig. 3—On a gage of the type shown here, a single motion introduces the workpiece into gaging position where, simultaneously, the readings on three diameters and one on eccentricity are obtained.

to existing jigs and fixtures. In a similar manner some gage already in stock can often be revised. As a small example, the button shaped anvils regularly supplied by the manufacturer on the gage appearing in Figure 1 were altered to chisel points, as Figure 1 illustrates, so that the gage could get up close to shoulders and detect excess fillets. Figure 2, as another example, cannot show all the transition but this was a gage the owner had used for a commercial product component and had it changed over when he took on an ordnance contract.

Revamping a manufacturer's catalogue gage is somewhat comparable to picking the factory made suit off the gas pipe rack and having the clothier alter it a little to drape your general stature and profile. But there are other times when you have a professional tailor take all your measurements and fit a bolt of cloth exactly to all the peculiarities of your physique. The similar idea of designing and making a gage from scratch for a particular component is decidedly on the increase; the special gage is considered a part of the tooling up process.

There are at least six good reasons why the metal worker can profitably consider a tailor-made gage. First, it is a time and energy saver. Secondly, it offers precisions and accuracies in measurement difficult to get in any other way (such as a surface plate set-up for example.) The tailor-made gage can be designed to reach readily the hard to get at measurements. It will check the conformance of odd shapes for which there is no other measuring method available. Where the conformance of geometrical conditions like squareness, concentricity, skew, is essential, the gage must be, almost without exception, specifically designed for the condition. And finally, tailor-made gages get rid of bottlenecks; gages are contrived so the work is measured while it flows from one operation to the next.

Today's production operations never skive off a lone layer of metal unless there is no other alternative. They are tooled to form as many dimensions as possible in one crack at the piece before it comes tumbling down the

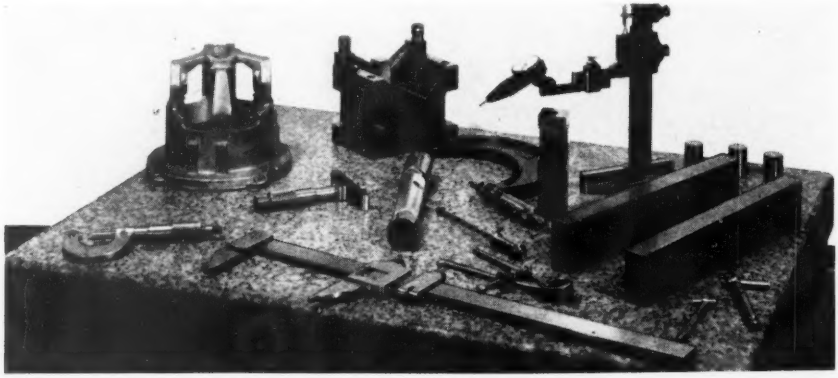
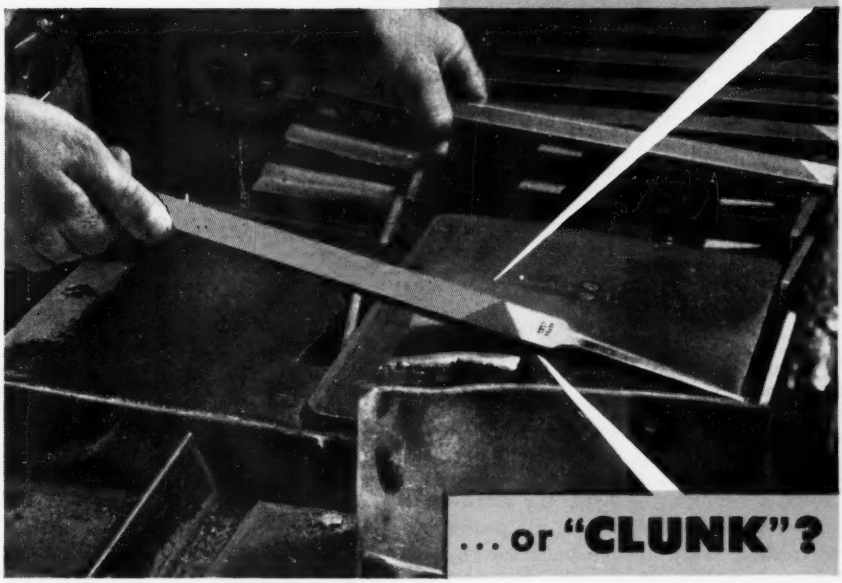


Fig. 4A—The possibilities of errors from manipulation, "feel," pressure and temperature, as well as from a variety of methods of instrument reading, appear in the illustration herewith.

Does it say "CLINK"



One of the proofs of a file's basic soundness is its clear ring—"clink"—when you tap it lightly on an anvil or other hard piece of metal. A dull "clunk" is usually a sign of "water cracks" or poor hardening.

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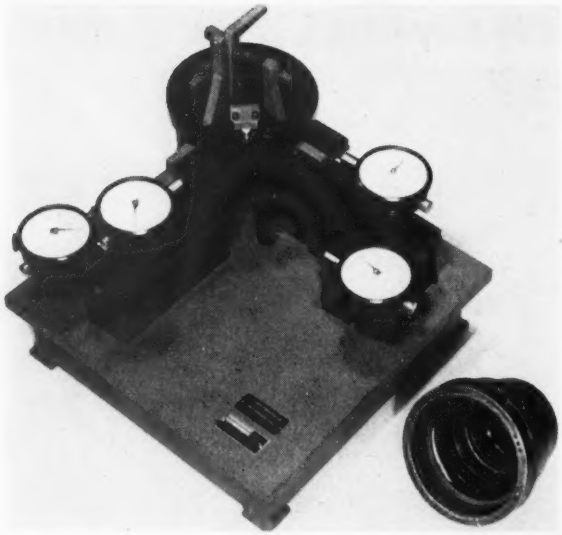


Fig. 4B—Illustration showing an instrument setup tailored for the same type of dimensions desired from setup shown in Fig. 4A.

chute. To check the part, the worker would traditionally fish in his pocket for mikes, reach around back for vernier calipers and finally scramble among the chips and oil on the machine fed for snap and plug gages.

The time saving gained from the tailor-made gage illustrated in Figure 3, as an example, becomes fairly obvious at first glance. A single motion introduces the workpiece into gaging position where, simultaneously, the readings on three diameters and one on eccentricity are obtained. The multi-dimensional gage also helps the operator in another respect by pointing out which particular station on his machine may need attention or adjustment.

A statement has been ascribed to a methods engineer in one of the automotive plants that it pays most anywhere, anytime, to invest $500 in equipment, tooling, materials handling and gaging to save one second in a machine hand's operating cycle. While we might argue the exactness of the figure, nevertheless there is no ducking the principle. By such means, astute executives use little ways of saving time effectively, all of which adds up to making big money.

Time and energy saving tie in closely with precision and accuracy as far as gaging is concerned. When a thing is easy and natural to do—neither cumbersome, awkward, slow nor tiresome—when it requires no unusual mental concentration or calculation, it is generally done better. Where multiple dimensions are checked with a series of different gages there are as many chances for errors as there are dimensions and instruments to read. Furthermore, if the gaging is done with hand gages, the errors of cramping, dirt and temperature seem bound to creep in, to say nothing of the well known effect of pure muscle in forcing a gage. Micrometer type equipment cannot escape the built-in leverage which a screw jack takes advantage of, and in the ordinary handling of vernier instruments a man is easily liable to apply extra power at the point of measurement from the sheer lever length of the scale beam.

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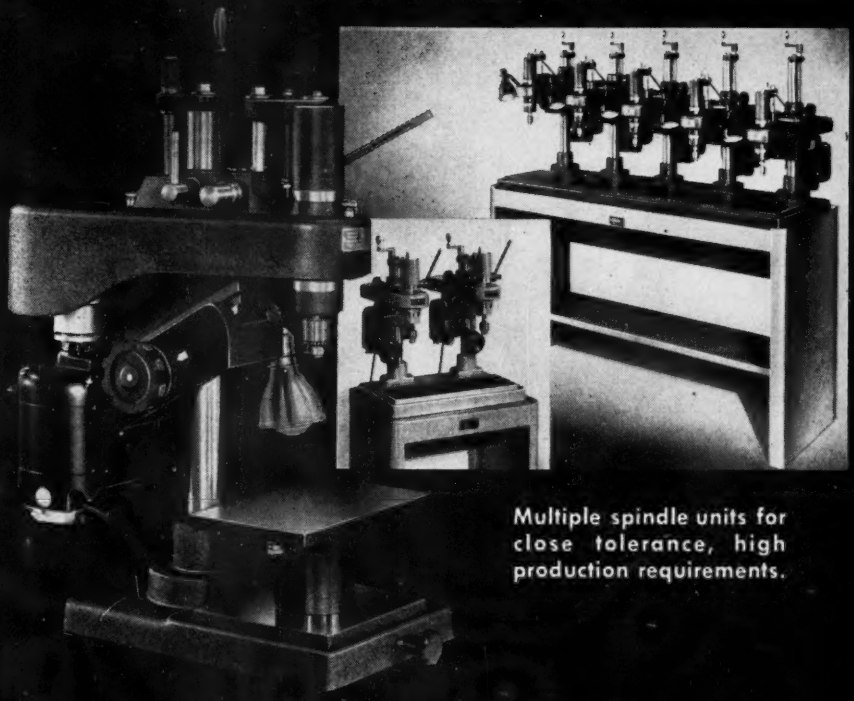
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gage, on the other hand, has the precision angle strongly in mind. Because he tends to come up with a layout where the workpiece measurement will require a minimum of manipulation and time, his design will simultaneously prevent error forming cramping and pressures. The futility of bothering to specially design a gage which is not going to give an accurate report is self evident.

The possibilities of errors from "building block" equipment, from manipulation, "feel", pressure and temperature, as well as from varieties of methods of instrument reading, appear in the apparatus pictured in Figure 4A. To get a contrast, look at the gage in Figure 4B tailored for the same type of dimensions. In addition to speed and precision gained, this gage design paid for itself in a few months because the machine operator could use it readily and the services of an inspector were cancelled.

Special design gages step in next to help the machinist with hard to get at measurements. Figure 5 (A, B, C, D) portrays diagrammatically some of the milder problems of measurement modern equipment design poses. A recessed diameter like that pictured in 5A can sometimes be measured with conventional equipment but ninety-nine times out of a hundred it calls for the design and manufacture

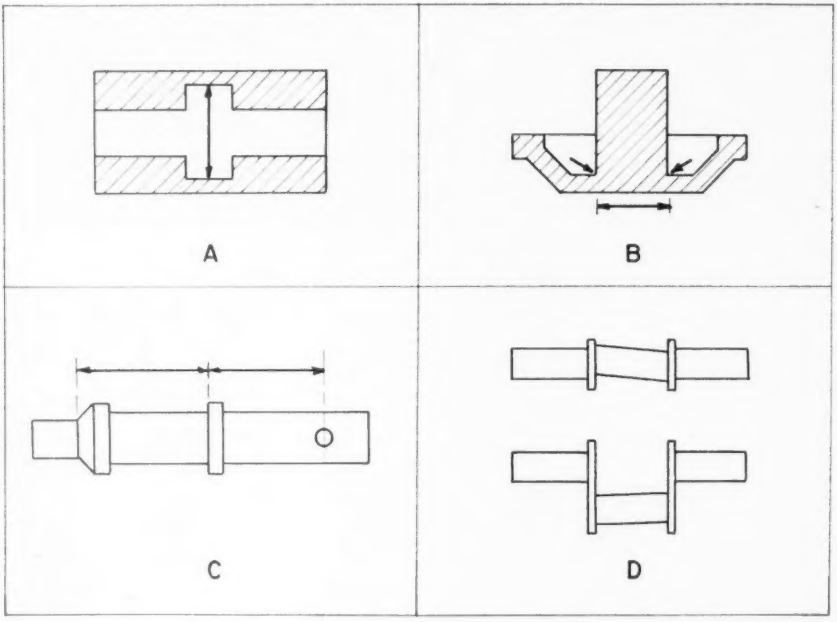


Fig. 5—These drawings portray very dramatically some of the mild problems of measurement modern equipment design poses.

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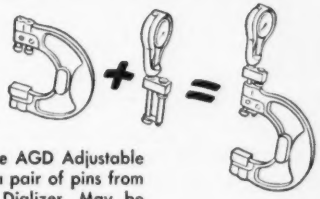
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Fig. 6—The gage which the operator is shown using here literally lifts the exact measurement of the workpiece up to eye level.

of a gage specifically fitted to the particular case and certainly where precision measurement is called for.

A bottom dimension such as 5B exemplifies—how would you get it without rigging up something special in a gage? Figure 5C is supposed to illustrate, as one of hundreds of examples, the question of location which, without specially designed gaging equipment, becomes a bugaboo to the man on the job trying to horse out accurate parts. Then as a teaser, add the idea of parallelism or alignment in two planes pictured in 5D, (the errors have been exaggerated). The man who forges cranks, the man who roughs or grinds them needs help—something better and quicker than a surveyor's transit—to tell whether he's forming a long wearing, balanced and true piece of high speed mechanism or a Rube Goldberg Model. Another common, modern day example of work-

pieces that cannot be adequately size checked without special gaging equipment are the skewed, twisted tapered curvatures of jet engine or turbine rotor buckets.

The particular bore, thickness or diameter being turned on a machine may not be in itself very difficult to measure. At least it is a relative cinch with available equipment once the part is out of the machine and accessible from all angles on a bench. But there are many occasions where the operator needs a check on how he's coming while the piece is still clamped in the machine. You will see him go through the weirdest contortions, sometimes, to get over in with mike or plug. Little wonder some machinists reach old age gnarled, bent and twisted like a weather beaten oak. Gages can be designed which will themselves get down inside, without the operator diving in after them, and lift the exact measurement up before his eyes. The man in Figure 6 has been conveniently equipped in this time and energy saving manner. You get the idea also that, since his shop bothered to make his job easier, his output contained less scrap and rework.

Product designers are not yet through conceiving odd shapes—

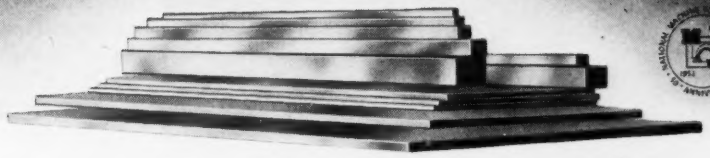
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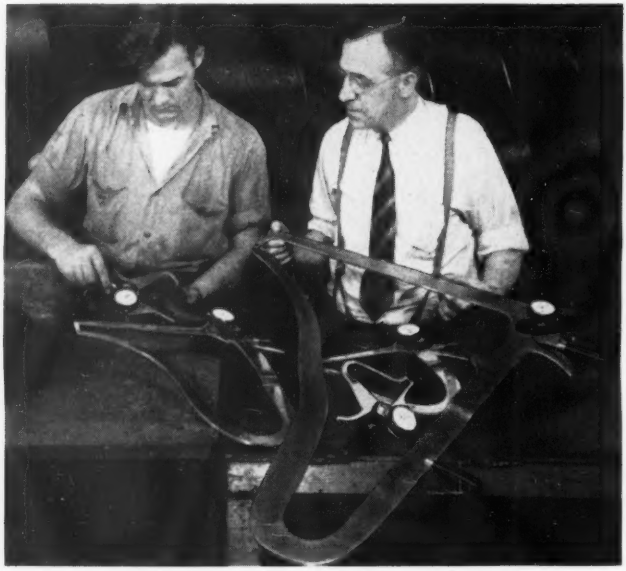
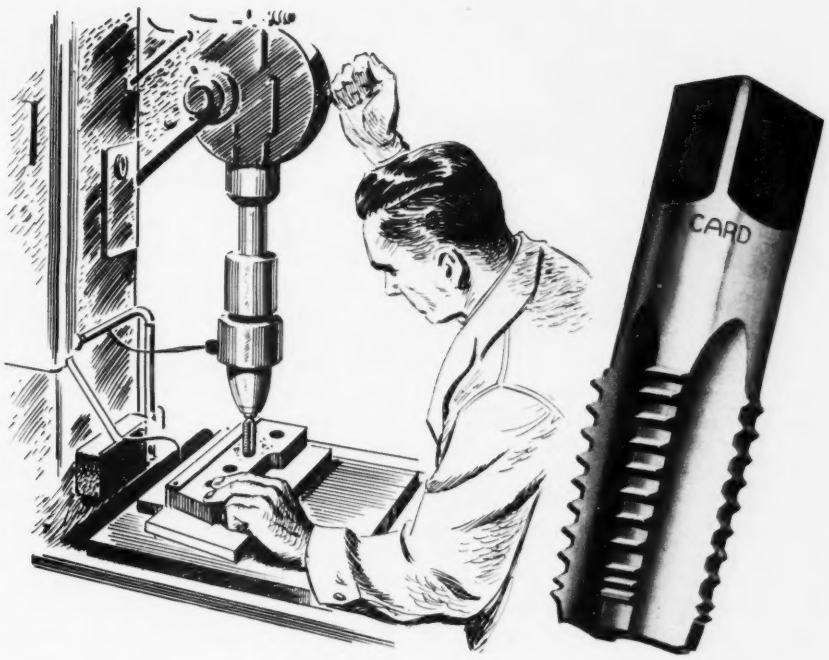


Fig. 7—The fairly uncomplicated example of fuel bends and elbows shown here illustrates the extent and peculiarities of special gage design that may be resorted to where a manufacturer wants to be sure enough metal exists to withstand pressures.

sometimes torturous mazes—in the form of castings. Somehow the pattern maker and the foundryman manage the required fourth dimensional conceptions and come up with the cast metal shapes desired. At least they look all right from the outside. But molten metal has a knack for not following directions especially where its trickery can be concealed. On most of these pieces there are three general choices: (1) don't try to check for web and wall thickness or location at all and take a chance or (2) cut, section, sample castings (or X-ray them) or (3) devise special gages. The fairly uncomplicated example of simple fuel pipe bends and elbows pictured in Figure 7 illustrates the extent and peculiarities of special gage design that may be resorted to where a manufacturer wants to be sure enough metal exists to withstand pressures.

What might be called geometrical conditions or measurement relationships lead many times to the adoption of special design gages. The long words refer to such elements as squareness eccentricity (or concentricity), angles and taper, out-of-round. For one thing, when a gage designer goes at the creation of a gage for measuring, say, diameters, he usually keeps the matter of relationships in mind. Hence, he will put in a gaging "station" or contrive his apparatus in some manner so that it will measure simultaneously a geometrical condition like ovality, squareness or alignment for instance. The gage you looked at back in Figure 3 measures three diameters and the concentricity or alignment of the midsection of the part.

Some peculiarity in the shape of a component often makes a tailor-made gage imperative for specially checking some relationships. The little gage appearing in Figure 8 pictures such a condition. It was not satisfactory to check the concentricity of I.D. to O.D. of this part in the machine with an in-



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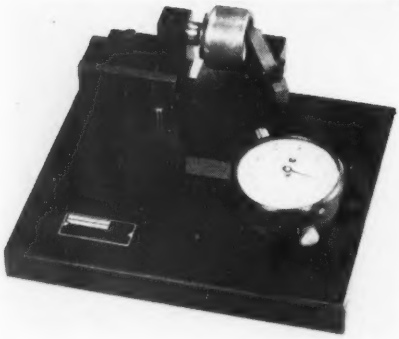


Fig. 8—An example of a tailor-made gage designed to check the concentricity of i.d. to o.d. simultaneously.

dicator or a test set because of the measurement errors the runnout of the machine itself might introduce. A V-block and test set on a surface plate would have been a natural inspection selection but for the unusual shape of the cup like component and the strict requirement for locating it laterally very precisely. Besides, it was necessary to check these pieces frequently and rapidly.

There is an old saying among inspection administrators that the closer to the source of manufacture the decision is made that the work is right or wrong, the less that sort of product will cost. Such philosophy brings us last but not least to another field for the tailor made gage. Size control in the future may well be automatic. Practically every shop that uses grinders knows the familiar automatic grinding gages that ride the work like jockeys and tell the operator its size instantly and continuously. Automatic control gaging in the continuous processes like wire drawing, rolling sheet and forming rod is becoming fairly common. In practically every case the basic construction of the gaging sys-

Fig. 9—A close-up view of an automatic gaging unit for inspecting wrist pins.



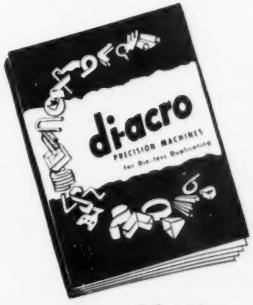
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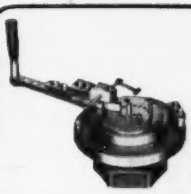
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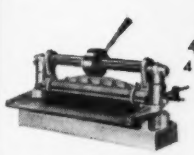
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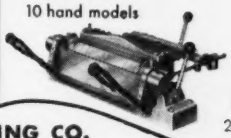


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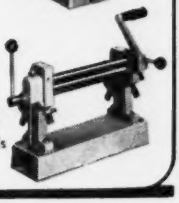


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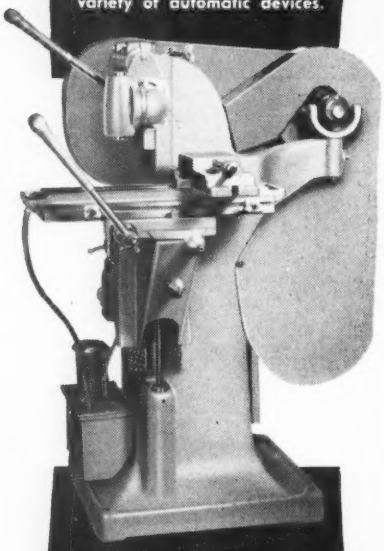


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tem must be tailored to the peculiarities of local circumstances.

These are specialties. For ordinary manufacture, however, there is a growing tendency to fashion gages which will accept the parts directly from the machine chute, gage them, classify them as to size if desirable, or reject them. A great deal of progress has been made, for instance, in the machining, cleaning, gaging, greasing and packaging auto wrist pins all in one straight line series of push button, automatic equipment. Figure 9 shows a close up of the gaging unit which stands in the wrist pin production line.

The great majority of machine shops still build between 8 per cent and 30 per cent oversize pieces and parts every day. From ½ per cent to 4 per cent are, on the average, undersize. Other machining operations and relationship conditions like concentricity may account for from 3 per cent to 10 per cent loss. Such figures are hard for managements to swallow but a truly unbiased study out on the shop floor almost always verifies them. Now these figures "ain't hay". In terms of dollars, be the shop large or small, they represent a sizable boodle of cash in the course of a year which, if it were saved, would help to pay for a lot of correction in the form of better machining and gaging facilities. Experience points out that the tailor-made gage, because of its particular faculty for disclosing and cutting down losses, pays for itself within a few months and thereafter gives a lot of service rent-free.

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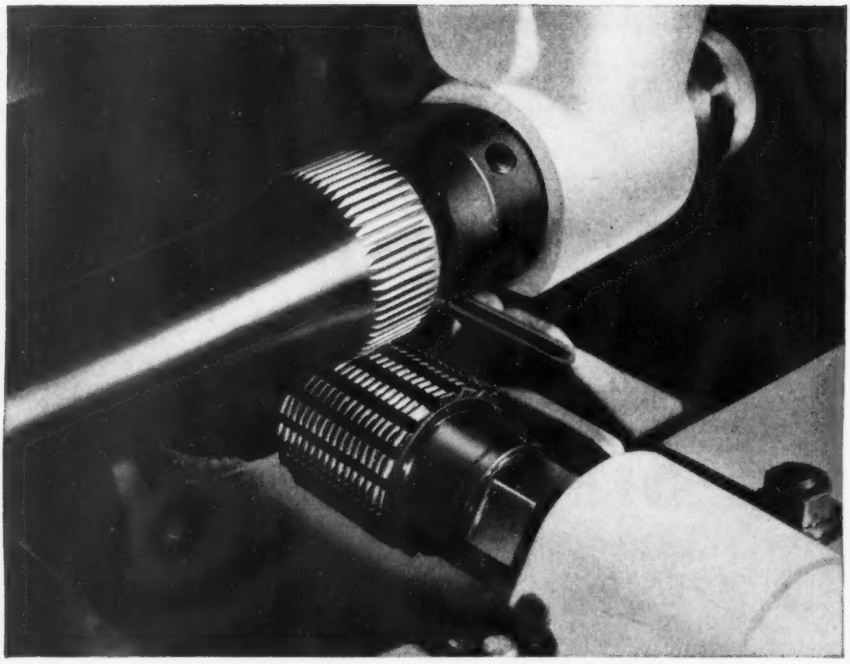
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Barber-Colman HOBBING

DOUBLES TOOL LIFE • CUTS PRODUCTION TIME

HARD STEEL TORSION BARS, 45-50 R. C.

Hobbing tough, hard materials — such as this torsion bar job — presents no special production problems when you use the Engineered Hobbing approach.

These torsion bars, 45-50 Rockwell "C", approach the upper limit of machineability for hobbing. Structure and toughness of the material caused hob teeth to wear rapidly.

Barber-Colman Hobbing Engineers worked closely with production officials in this plant to produce the desired results on this job. Substantial tool savings, increased tool life, and better production time resulted. Total hob life has increased from approximately 600 to over 1200 ends.

BUILDERS OF PRECISION GEAR

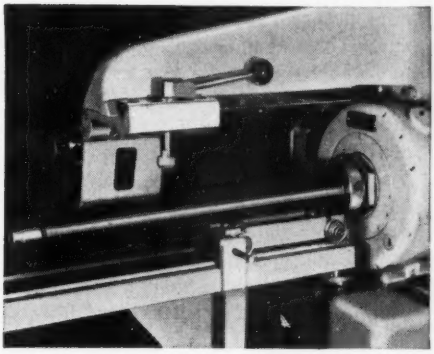
TOOL COSTS REDUCED WITH CLASS C ACCURATE UNGROUND HOBS

Barber-Colman engineers recommended 4-thread Class C Accurate Unground Hobs and automatic hob shifting to increase tool life and production in this hard material. Results showed an average increase from 65 to 120 hobbed ends per hob sharpening. The use of unground hobs has reduced tool cost considerably. Cutting time is 5 minutes per end, the length of cut being 1⅛".

The form on the hob is a 48° 44′ pressure angle serration with a full radius at the top of the tooth. The hob is non-topping. Climb hobbing allows the hob tooth to start its cut in metal which has had no opportunity to be work hardened.



COMBINED ENGINEERING OF HOBS, TOOLING AND MACHINES PRODUCES BENEFITS



Results obtained on this hobbing job show the benefits possible when hobs, machines and tooling are combined through proper engineering to meet the specific problems of the job.

New No. 16-16 Hobbing Machines are used, equipped with 30" rear overhanging center bracket. Bars are loaded from the rear of the spindle, where the operator easily pushes them from a conveyor into the spindle. A special steadyrest bracket guides the bar and protects the hob while loading. Work change time is 1½ minutes.

You, too, can simplify your hobbing problems by consulting Barber-Colman engineers. Why not contact them today for an evaluation of your hobbing methods.

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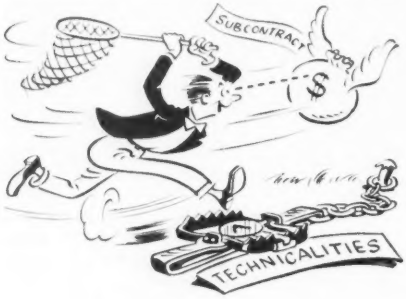
HOBS AND MACHINES SINCE 1911

Let the Subcontractor Beware

Timely tips on how to handle details relative to subcontracted work.

By R. J. FLYNN

MAYBE you are one of the shop owners who made a mad rush during the past fifteen months to the prime contractors to taste the apparently dollar rich food of subcontract work. If you did, and you had a strong stomach you have thrived. But, if you



"It is the fault of those who rushed blindly in to snap up work without watching out for the traps."

were not prepared for the highly seasoned fare, you have probably developed economic indigestion and many a real live ulcer. Maybe you thought you had discovered the long awaited key to expansion only to find out that the door had a double lock. I hope not, but if you did or if you are just entering into subcontract work, a look at the problems involved and how to avoid them might do you good.

Illustrated by Don Ritchie.

The reasons for the set backs are many and varied. Constant alterations in planned appropriations, increased stability after mushrooming of the primes and highly specialized types of work being subcontracted are some of the reasons. There is one reason, however, that is not the fault of the Government or the prime contractors. It is the fault of those who rushed blindly in to snap up work without watching out for the traps.

Take the case of Harry C. for example. Between 1947 and 1951 big orders were few and far between. In his medium-sized shop Harry did everything he could be keep the top-grade men he had carefully groomed during the war years. With increased wages plus profit-sharing insurance and health plans, sick leave and liberal vacations, he had done well by his men but not too well by himself. Of the quality of his work there was no question. So when a prime contractor told his he was sending him some close tolerance work comprising a big order, he was justly proud. Because of the type of work involved he figured in a substantial but not exorbitant profit. When the order arrived, his wife, who did his bookkeeping, brought it in to

discuss the order with him:

"What's this clause about 'audit and redetermination' stamped on the front?" she asked.

Harry waved her off. "Don't worry about that," he laughed. "That's old stuff. It means the Government can come in and decide whether we made too much on their business this year. At the rate we've been going there's not much chance of that. Besides the minimum is $250,000 and we won't touch that."

"I was just wondering, Harry ——— ———" she said.

"Well, you don't have to wonder. Just leave that to me, never mind about the fine print. We've got the business, we can knock this kind of stuff off standing on our heads and we'll soon be out of the red."

Harry was partly right. Soon his machines were purring, rejections were almost non-existent and the delivery schedules were being met. Everything was looking rosy until some visitors arrived.

It was not a social call. They informed him that they were from the prime's auditing section and had come to check his costs and profit. He was soon informed that his profit was too high and that his prices would have to be reduced. When Harry tried to explain that his overall profit on the year was low, they politely informed him that that was not their problem. After all, they asked, did he expect them to make up for his prior losses? He had found to his despair that what he thought would put him ahead had left him even.

Harry's mistake is a common one. He misunderstood a "Redetermination" clause for a "Renegotiation" clause. They are as different as night and day but this frequent misinterpretation has caused untold misery among subcontractors. And yet the distinction is simple.

Briefly, "Renegotiation" is the process through which the Government gets back excess profits paid to companies doing work under Government contracts. Under the 1951 Act it applies only to those firms whose Government work exceeds $250,000.-00 during any fiscal year. In addition, the 1951 Act provides that all Government work in the fiscal year is lumped together and the overall profit is computed. Thus, a company can just break even on one contract and make a substantial profit on another and the two may balance themselves out. In other words, the Government will not take back, under renegotiation, the heavy profit that was made on one and leave the company holding the loss on the other. The Government will neither put you in the poor house nor make you a millionaire over night.

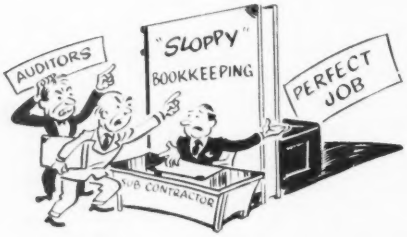


"He misunderstood a redetermination clause for a renegotiation clause."

Under a "Price Redetermination" or "Revision" (usually downward only) clause, however, only the one contract is concerned. In short, under "Redetermination" the government or the prime contractor, if subcontract work is involved, computes your costs and profit and usually sees to it that the profit is limited to somewhere between 10 and 15 per cent.

Thus, it is evident that where an over-all annual profit might be such

that the Government should not demand any repayment under "Renegotiation," the profit on a "Redeterminable" contract might be severely reduced even though the manufacturer might have sustained losses on all other contracts. Occasionally, a "Redetermination Clause" provides for an upward revision of prices, but such



"What stands out is not the high quality of the work . . . , but rather that the shop is guilty of sloppy bookkeeping and argued over the results of the audit."

clauses in subcontracts are few and far between. The Redetermination clause will usually provide also for some type of auditing privileges on the part of the prime contractor. Almost all subcontracts provide for auditing by Government representatives, and therein lies another of the great pitfalls for the subcontractors. A firm might do the highest type of work, observe delivery schedules even if it means extra overtime not provided for in the order and deliver the pieces exactly to specifications, properly segregated and packed. An apparently perfect job. The manager is sure that the performance will really make the shop's reputation soar, and then the auditors arrive.

In the rush to get the work done the pieces were moved from one machine to the other. The time spent on the run of each item on the order is all lumped together. There is no way of computing the cost of each different part, or even worse, where the shop is doing work for more than one prime or is even doing some non-Government subcontracting, the time for all jobs is grouped together. There is no way of ever segregating the amount of time put to work on any one order not to mention any one part. In the last instance, the subcontractor has made two problems for himself.

First of all, since exact costs cannot be ascertained for any one order, the auditors will naturally make a mere estimate as to what part of the work week was devoted to their firm's work and figure the cost of their order. The extra time spent on any difficult items is lost in the shuffle. The sweat for perfection evaporates under the glare of statistics. There is the inevitable squabble over what costs applied to that order and, as a result, the actual percentage of profit. In any event, neither of the parties is overjoyed.

And then comes the second slap in the face. The auditors, and rightly so to their way of thinking, go back to their company and make their report. What stands out is not the high quality of the work or the faithful performance of the contract, but rather that the shop is guilty of sloppy bookkeeping and argued over the results of the audit. And somebody is bound to remember the description of the bookkeeping and by the time the ten or twelve copies of the audit report have been handed out the words will have left the general impression of sloppy work instead of just inattention to bookkeeping in the pressure of getting out good work.

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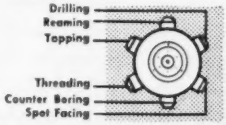
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chines and bring in a few tax experts thereby making the overhead zoom and price yourself right out of business? No, not by a long shot. The answer is almost too simple.

If you receive an order that is subject to redetermination and auditing, contact the prime and ask just what data they are going to need for the redetermination. You might also ask at the same time for an "upward revision" clause inasmuch as a "downward only" clause leaves most of the risk on you. All they can do is say 'No" and you might get an extra cushion. Ask them at what point they will be making their audit so that the books can be up-to-date and the presence of the auditors will not take away from your main problem, that of making the shop hum turning out good work.

Besides making a good first impression with the people who pay the bills for the prime by displaying an interest in the part of the order concerning them, you stand a good chance of not being bothered by auditors at all. If your cost data is properly presented it might be accepted as it stands. Thus, by a few hours of preparation, weeks of unscrambling, arguing and irritation have been avoided. In addition, you've gotten yourself some valuable cost data that might come in very handy when getting ready to bid for future orders.

Maybe you've got the Redetermination and audit problems well under control. Still there are other pitfalls it would be well to be wary of. So many terms are used loosely that their interpretation is let almost completely up to the prime contractor involved. "Time-and-Material", "advise price", "finished", "partial machining", and "specifications" have all come up for many heated discussions and it might be well to look over them briefly here.

Almost everyone has a theory on the meaning of "Time-and-Material" and "Advise Price" orders but not all theories are the same. They run all the way from the idea that the prime contractor has embarked on a vast educational program at either its or the government's expense to the thought that it is a straight "cost plus" subcontract. The latter theory is all wrong inasmuch as "cost plus" orders, as such, are strictly illegal. If you are going to act on the first theory you're going to have some job convincing the prime contractor that he has assumed all business risk. The answer lies somewhere in between the two mentioned above. One sore spot is usually the fact that each party thinks the other is to bear the cost of rejects or scrap or at least a portion. In other words, you are generally going to be expected to bear some portion of the business risk. Some prime contractors will only pay you for the "Time-and-Material" expended on the good parts delivered. Some will have firm prices after a certain number of pieces. Others have a scrap or reject allowance in excess of which you bear the loss. Still others will pay you a set fee per hour for the whole job including rejected work. But you can be sure that in the latter case that the prime is going to pay for junk



"Almost everyone has a theory . . ."

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only once. From then on he finds someone who will turn out quality work on his terms. In any case, when the prime contractor's representative places such an order with you, if it is not clearly stated on the order, you should find out what their policy and experience has been with such orders. It might keep you from counting some chickens that will never hatch. It is amazing what confusion the words "completely finished" can cause. Do they mean "finish machined" or does it mean anodized, impregnated, painted or any other type finished? If the print calls for anodizing or impregnation you probably have no choice and should figure it into your price. As far as finishes are concerned it might be well to contact your prime contractor to find out the finishing specifications and also whether or not the prime has any preferred finishing houses which do all their work. Many subcontractors have figured their price very carefully in order to get the business only to find that they have added finishing costs which might completely wipe out their profits.



". . . only to find that they have added finishing costs which might completely wipe out their profits."

In this same vein you are likely to run into a clause calling for machining to "our specifications" and then, midway in the job you find a difference between the prints and operation sheets (where both are supplied). In many cases, the clause will read that wherever there is a conflict between drawings and specifications, the drawings shall prevail. In that event, you are all set. But if that statement is not on the order, you might get into trouble. Remember that one of the reasons you may be getting subcontract work is because the prime's shops are overloaded. You may be expected to deliver the work just as if your machines were in the prime's plant where you could ask questions everytime a problem arises. The operation sheet may differ from the prints because in assembly there is some added operation. On the other hand, if you follow the operation sheet you are liable to build quite a name for yourself in the prime's reject record file. The answer? Find out what is expected of you. Find out what the prime's shop policy is and then ask whether or not you are to do the same. If you have time, ask in writing and get a letter in return. What might be top-class work to you might mean assembly delay and junk to your buyer.

Orders for "partial machining" or for only one particular type of work such as milling or grinding offer another kind of problem. Perhaps the prime's milling machines are completely tied up for weeks. You bid on the milling work on a certain number of pieces by estimating the time involved, figuring in overhead and profit. Your bid is accepted and you find that you are doing Five Dollars ($5.00) worth of milling work on a casting on which the prime has already put in One Hundred Dollar's ($100.00) worth of work. Suppose you scrap one? Are you sure the previous operations were done correctly? What if there's a reject? Was it something that was done before or after it left your shop?

Generally speaking, the prime is not



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IS COMBINED OPERATIONS IN A SINGLE SET-UP

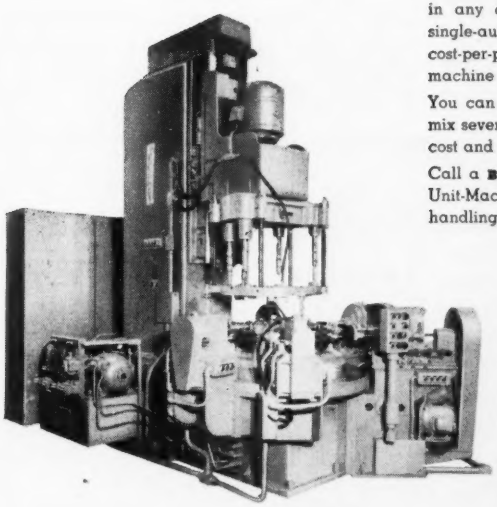
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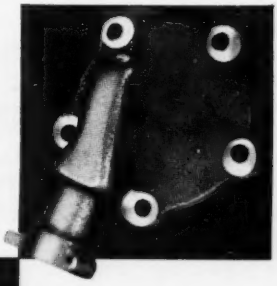
Every time you turn a spindle — or move a work piece it adds to your production cost. That's a good reason for you to combine as many metal-cutting operations as possible.

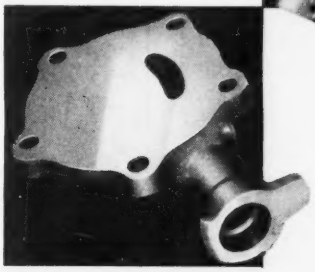
BARNESDRIL Engineers will arrange these operations in any desired pattern and production rate, in a single-automatic cycle, to give you lowest possible cost-per-piece. Work transfer-time and individual machine maintenance and downtime are eliminated.

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going to bill you back for the whole loss if you scrap some of those castings. But if he really wanted to get down to law, he could probably see that you would pay a solid share of the loss. So here the point to remember



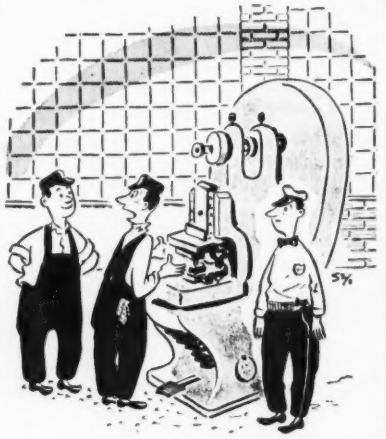
"In short, try to act as if you were part of the prime's shop."

is to find out just what the prime's feelings are under such circumstances. If you're to bear a substantial portion of such losses then you are entitled to a substantial contingency percentage in your price.

Now, what is the answer to all this? Certainly the answer is not to avoid subcontract work. But neither is it, as so many have done, to rush in blindly snapping up anything and everything.

Once again the answer is somewhere in between the two extremes. Take as little for granted as possible. The fine print on the order might have the same abhorrence for you as an insurance policy. On the other hand, proper compliance with the terms of the order is your insurance for future business. Remember that the prime contractor is probably completely bogged down trying to produce and expand at the same time and would like to lean on your shop and others like yours as much as possible. Each modern day shop is a vertebra of the body of Industry. Without these vertebrae the body would collapse. On the other hand one sick or malformed vertebra can really make the industry scream in pain. No prime contractor is going to try to put you out of business but neither will he let you walk all over him. In short, try to act as if you were part of the prime's shop. Find out what his policies are and conform to them or else do not do business for them. And lastly, when in doubt about some part of the order, ask before you move. Once the air is cleared all you have to do is send in the parts —and your invoices. They will both be promptly accepted.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS opposite Page 436.



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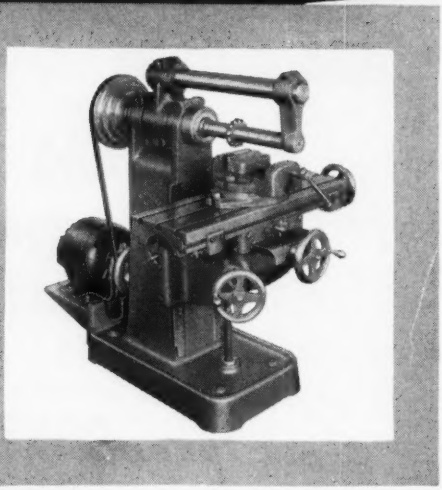
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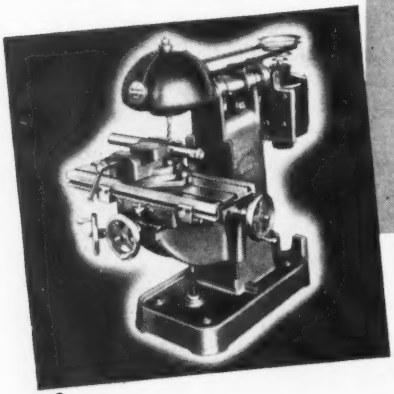
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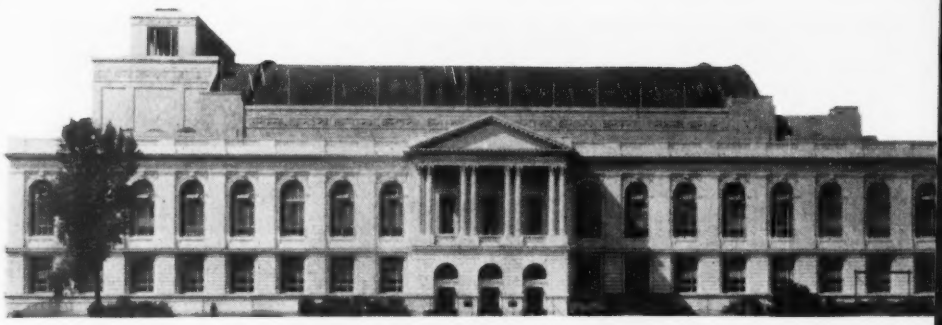


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Philadelphia Convention Hall

34th National Metal Congress and Exposition

PHILADELPHIA will be the 1952 host to the four participating societies who will cooperate in presenting the 34th National Metal Congress and Exposition which is to be held in the city October 18 to 24, inclusive. The four societies are the American Society for Metals, American Welding Society, Metals Institute Division of the American Institute of Mining and Metallurgical Engineers, and the Society for Non-Destructive Testing.

The primary purpose of the Annual Metal Congress and Exposition is to bring together the experience, the knowledge, and the means for a more effective use of metals in the making of products for civilian use and for the making of products that will ensure our defense against aggression and thus guarantee our security and liberty.

Exhibits

Over 400 nationally-known firms engaged in either the production of metals, the treatment of metals, the fabrication of metals into component parts or products, or in rendering services to all of these fields will have exhibits. Nearly five acres of floor space will be devoted to exhibits. In addition, thousands of square feet of floor space will be utilized for special meetings, forums, lectures, and other activities.

Technical Programs

The four sponsoring societies, through their scheduled seminars, lecture sessions, and meetings on technical subjects pertaining to metals production, treating, and processing, will provide the National Metal Congress and Exposition visitors with daily opportunity to hear vital technical subjects discussed and analyzed by some of the world's leading engineers and teachers. The American Society for Metals will hold its annual seminar on Saturday morning and afternoon and Sunday morning and afternoon, October 18-19. Throughout the week of the Metal Congress, the American Society for Metals and the American Welding Society will hold morning, afternoon, and evening technical meetings. The Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers will hold daily and evening technical sessions Monday through Wednesday. The Society for Non-Destructive Testing will hold sessions during four days of the Congress week.

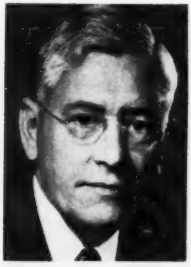
ASM Metallographic Exhibit

The seventh Metallographic Exhibit of the American Society for Metals will be held during the week of the National Metal Congress and Exposition. A large area within the Philadelphia Convention Halls, scene of the "Metal Show," has been reserved so that displays of the Metallographic Exhibit can be shown to best advantage. Work which has appeared in previous ASM Metallographic Exhibits is not acceptable.

Ten classifications of micros are designated for the contest, including tool steels and tool alloys; stainless and heat-resisting steels; other steels and irons; aluminum, magnesium, beryllium, titanium, and their alloys; copper, zinc, lead, nickel, and their alloys; metals and alloys not otherwise classified; series showing transitions or changes during processing; surface phenomena; results by unconventional techniquse (other than electron micrographs); slags, oxides, and inclusions.

There will also be a competition for undergraduate students at the 1952 Metallographic Exhibit. First prize, a bronze medal and $25 cash; honorable mention, a ribbon and $10 cash. A committee of judges, appointed by the Metal Congress management, will award a first prize (blue ribbon) to the best entry in each classification. Honorable mention will be awarded to those closely approaching these winners. A Grand Prize (engrossed certificate and $100 cash) will be presented to the exhibitor whose entry is adjudged best in the show. The Grand Prize entry becomes the property of the American Society for Metals for preservation and display at the Society's National Headquarters.

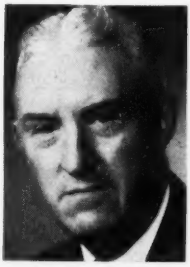
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ASM Seminar on Modern Research Techniques in Physical Metallurgy

Technical Sessions at the Hotel Benjamin Franklin

Saturday Morning, October 18

Metallographic Methods

Optical Microscopy—By George L. Kehl, Columbia University
Electron Microscopy and Diffraction—By Robert D. Heidenreich, Bell Telephone Laboratories
Crystal Growth and Crystal Boundary Techniques—By Bruce Chalmers, University of Toronto

Saturday Afternoon, October 18

Diffraction Methods

X-Ray Diffraction Techniques—By Charles S. Barrett, Universtiy of Chicago
Diffuse Scattering of X-Rays—By B. E. Warren and B. L. Averbach, Massachusetts Institute of Technology
Pole Figure Determinations—By A. H. Geisler, General Electric Company
Techniques and Applications of Neutron Diffraction—By C. G. Shull, Oak Ridge National Laboratory

Saturday Evening, October 18

Demonstration Lecture

Electron Emission Studies of Metallurgical Problems—By Erwin W. Mueller, Pennsylvania State College

Sunday Morning, October 19

Mechanical Methods

Deformation of Single Crystals—By Earl R. Parker and Jack Washburn, University of California
High Speed Strain Measurements—By George R. Irwin, Naval Research Laboratory
Internal Friction—By Professor Charles A. Wert, University of Illinois

Sunday Afternoon, October 19

Ferromagnetic and Radioactive Methods

Ferromagnetic Domains—By H. J. Williams, Bell Telephone Laboratories
Radioactive Tracers—By M. B. Bever, Massachusetts Institute of Technology
Radioaction Damage as a Research Technique—By Sidney Siegel, North American Aviation, Inc.

Program of ASM Technical Papers

Technical Sessions at Hotel Benjamin Franklin

Monday, October 20—9:30 A.M.

Creep Rupture and Recrystallization

Creep-Rupture and Recrystallization of Monel from 700-1700° F.—By N. J. Grant, Associate Professor, and A. G. Bucklin, Staff Member, Department of Metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

Influence of Grain Size on High Temperature Properties of Monel—By Paul Shahinian and J. R. Lane, members of the Metallurgical Division, Naval Research Laboratory, Washington, D. C.

Creep and Rupture of Chromium-Nickel Austenitic Stainless Steels—By E. J. Dulis, G. V. Smith, and E. G. Houston, Research Laboratory, United States Steel Co., Kearny, N. J.

Recrystallization and Grain Growth in Alpha Brass—By S. L. Channon, Kaiser Aluminum and Chemical Corp., Spokane, Wash., and H. L. Walker, Head, Department of Mining and Metallurgical Engineering, University of Illinois, Urbana, Ill.

Monday, October 20—2:00 P.M.

High Temperature Phases

Microconstituents in High Temperature Alloys—By H. J. Beattie, Jr., Physicist, and F. L. VerSnyder, Metallurgist, General Electric Co., Thomson Laboratory, West Lynn, Mass.

Sigma Formation and Its Effect on the Impact Properties of Iron-Nickel Chromium Alloys—By A. M. Talbot and D. E. Furman, Research Laboratory, International Nickel Co., Inc., Bayonne, N. J.

Mechanism of the Carburization of Some Stainless Steels—By J. B. Giacobbe, Metallurgist, Superior Tube Co., Norristown, Pa.

The Electrolytic Separation and Some Properties of Austenite and Sigma in 18-8-3-1 Chromium-Nickel-Molybdenum-Titanium Steel—By T. P. Hoar, Dept. of Met., University of Cambridge, England, and K. W. J. Bowen, Research Dept., Imperial Chemical Industries, Birmingham, England

Tuesday, October 21—9:30 A.M.

Phase Transformation

The Effect of Composition on the Temperature of Spontaneous Transformation of Austenite to Martensite in 18-8 Type Stainless Steel—By G. H. Eichelman, Metallurgist, American Brass Co., Waterbury, Conn., and F. C. Hull, Manager, Metallurgical Section, Westinghouse Electric Corp., E. Pittsburgh

The Effect of Silicon on the Tempering of Martensite—By A. G. Allten and P. Payson, Assistant Director of Research, Crucible Steel Company of America, Harrison, N. J.

The Mechanism and Kinetics of the First Stage of Tempering—By C. S. Roberts, Metallurgical Laboratories, Dow Chemical Co., Midland, Mich., B. L. Averbach, Assistant Professor, and M. Cohen, Professor of Physical Metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

The Order Disorder Transformation Viewed as a Classical Phase Change—By F. N. Rhines, Professor of Metallurgy, and J. B. Newkirk, Carnegie Institute of Technology, Pittsburgh.

Program of ASM Technical Papers—*Continued*

Tuesday, October 21—2:00 P.M.

Hardenability

An End-Quench Test for Determining the Hardenability of Carburized Steels—By F. X. Kayser, Research Metallurgist, and R. F. Thompson, Head, Metallurgy Department, Research Laboratories Div., General Motors Corp., Detroit

The Influence of Boron on Case Hardenability in Alloy Carburizing Steels—By C. F. Jatczak, Research Metallurgist, and E. S. Rowland, Chief Metallurgical Engineer, Timken Roller Bearing Co., Canton, Ohio

Effect of Carbon Content on 18 4-1 High Speed Steel—By A. H. Grobe, Research Metallurgist, and G. A. Roberts, Chief Metallurgist, Vanadium-Alloys Steel Co., Latrobe, Pa.

Correlation of Machinability with Inclusion Characteristics in Resulphurized Bessemer Steels—By L. H. VanVlack, Process Metallurgist, United States Steel Co., Pittsburgh

Wednesday, October 22—9:30 A.M.

ASM Annual Meeting

Edward DeMille Campbell Memorial Lecture—By Dr. Cyril Stanley Smith, Director, Institute for the Study of Metals, Chicago, Ill.

Wednesday, October 22—2:00 P.M.

A Study of the Mechanism of the Delayed Yield Phenomenon—By T. Vreeland, Jr., D. S. Wood, and D. S. Clark, Department of Mechanical Engineering, California Institute of Technology, Pasadena, Calif.

Determination of Oxygen in Metals and Metal Oxides by the Isotopic Method—By A. D. Kirshenbaum and A. V. Groose, Research Institute of Temple University, Philadelphia

The Indium-Arsenic System—By T. S. Liu, Horizons, Inc., Cleveland, and E. A. Peretti, Acting Head, Department of Metallurgy, University of Notre Dame, Notre Dame, Ind.

Thursday, October 23—9:30 A.M.

Mechanical Properties

The Effect of Quenching and Tempering on Residual Stresses in Manganese Oil-Hardening Tool Steel—By H. J. Snyder, Research Associate, Mellon Institute of Industrial Research, Pittsburgh

X-Ray Measurement of Residual Stress in Hardened High Carbon Steel—By A. L. Christenson, Research Metallurgist, and E. S. Rowland, Chief Metallurgical Engineer, Timken Roller Bearing Co., Canton, Ohio

The Endurance Limit of Temper Brittle Steel—By R. D. Chapman, Research Metallurgist, and W. E. Jominy, Chief Metallurgist, Research, Chrysler Corp., Detroit

Plastic Stress-Strain Relations of Alcoa 14S-T6 for Variable Biaxial Stress Ratios—By Joseph Marin, Professor of Engineering Mechanics, L. W. Hu, and J. F. Hamburg, Dept. of Engineering Mechanics, Pennsylvania State College, State College, Pa.

Thursday, October 23—2:00 P.M.

Temper Brittleness

The Effect of Various Heat Treating Cycles Upon Temper Brittleness—By J. D. Jaffe and D. C. Buffum, Watertown Arsenal Laboratory, Watertown, Mass., and F. L. Carr, National Research Corp., Cambridge, Mass.

Effect of Hardness on the Level of the Impact Energy Curve for Temper Brittle and Unembrittled Steel—By F. L. Carr, National Research Corp., Cambridge, Mass.; M. Goldman, Battelle Memorial Institute, Columbus; L. D. Jaffe and D. C. Buffum, Watertown Arsenal Laboratory, Watertown, Mass.

Transverse Mechanical Properties in an SAE 1045 Forging Steel—By A. H. Grobe, Research Metallurgist, Vanadium Alloys Steel Co., Latrobe, Pa., Cyril Wells, Member of Staff, and R. F. Mehl, Director, Metals Research Laboratory, Carnegie Institute of Technology, Pittsburgh

The Determination of the Plastic Constants of Metals by the Ultrasonic Pulse Technique—By M. B. Reynolds, Knolls Atomic Power Laboratory, General Electric Co., Schenectady, N. Y.

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Friday, October 24—9:30 A.M.

Elevated Temperature Properties

Temperature Dependence of the Hardness of Pure Metals—By J. W. Westbrook, The Knolls Research Lab., General Electric Co., Schenectady, N. Y.

Hardness of Various Steels at Elevated Temperatures—By F. Garofalo, P. R. Malenock, and G. V. Smith, Research Laboratory, United States Steel Co., Kearny, N. J.

Some Properties of a Nodular Iron at Elevated Temperatures—By M. S. Saunders, Graduate Student, and M. J. Sinnott, Associate Professor of Chemical and Metallurgical Engineering, University of Michigan, Ann Arbor, Mich.

Accelerated Strain Aging of Commercial Sheet Steels—By L. R. Shoenberger, Research Engineer, and E. J. Paliwoda, Research Engineer, Jones and Laughlin Steel Corp., Pittsburgh

ASM Educational Lectures

All Sessions in Ballroom, Convention Hall

Behavior of Metals at Low Temperatures

Monday, October 20—4:30 P.M.

Behavior of Single Crystals and Pure Metals—By R. M. Brick, Department of Metallurgy, University of Pennsylvania, Philadelphia

Monday, October 20—8:00 P.M.

Influence of Mechanical Variables—By J. R. Low, Jr., Knolls Atomic Power Laboratory, General Electric Co., Schenectady, N. Y.

Influence of Metallurgical Factors—By C. H. Lorig, Assistant Director, Battelle Memorial Institute, Columbus, Ohio

Gases in Metals

Tuesday, October 21—4:30 P.M.

Fundamental Metallurgical and Thermodynamic Principles of Gas-Metal Behavior—By D. P. Smith, Professor Emeritus, Princeton University, Princeton, N. J.

Gases in Nonferrous Metals and Alloys—By L. W. Eastwood, Assistant Director of Research, Kaiser Aluminum Co., Spokane, Wash.

Wednesday, October 22—4:30 P.M.

The Behavior of Gases in Liquid Iron and Steel—By D. J. Carney, Chief Development Metallurgist, United States Steel Co., Chicago

The Behavior of Gases in Solid Iron and Steel—By C. E. Sims, Assistant Director, Battelle Memorial Institute, Columbus, Ohio

Metallurgical Tools for Alloy Conservation and Increased Production

All Lectures by J. Alfred Berger, Acting Department Head, Department of Metallurgical Engineering, The University of Pittsburgh, Pittsburgh

Tuesday, October 21—8:00 P.M.

Significance of Chemical Analyses in Alloy Classification and Mechanical Properties

Progress in Spectrography and X-Ray Diffraction Analyses and Techniques

Wednesday, October 22—8:00 P.M.

The Effects of Alloy Substitution on the Fundamentals of Hardening Metals

Boron and Rare Earths in Alloy Conservation and Production



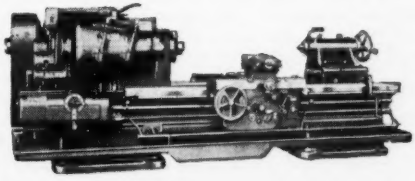
Boye & Emmes standard headstock with cover removed, showing constant mesh, wide face gears and large diameter, positive jaw, sliding clutches.

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Boye & Emmes Engine Lathe No. 300-141, owned by The Timken Roller Bearing Company, Canton, Ohio, was returned for factory inspection after twenty-five years of day-in-day-out use. During this period, Timken purchased repair parts from us, for this machine, to the extent of $154.15. Yet, when the headstock cover was removed at the factory the gearing was found to be "as good as new." This is usual.

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1952 ASM Award Winners

PRESENTATION of two top awards will be the feature of the annual dinner of the American Society for Metals, Thursday, October 23, which will be held in the Grand Ballroom of the Benjamin Franklin Hotel.

Gold Medal—American Society for Metals



Dr. Robert F. Mehl

Dr. Robert F. Mehl, Head, Department of Metallurgy, Carnegie Institute of Technology, Pittsburgh, Pennsylvania, is the 1952 recipient of the American Society for Metals' Gold Medal. The ASM Gold Medal was established in 1943 to recognize outstanding metallurgical knowledge and exceptional ability in the diagnosis and solution of diversified metallurgical problems. Dr. Mehl is one of the country's top authorities on metallurgical education and has made outstanding contributions to both the teaching and research in this field.

For twenty years Dr. Mehl has exerted a powerful influence on the development of metallurgical education in the United States. His long tenure at the Carnegie Institute of Technology has been marked by a steady flow of well-educated undergraduates into the mills and laboratories and the amount of research performed under his direction by graduate students, research assistants, and faculty associates has set standards and defined trends in physical metallurgy that are well recognized in the profession.

The 1952 Gold Medalist is a native of Pennsylvania and a graduate of Franklin and Marshall College. Dr. Mehl was associated with the Naval Research Laboratories, 1927 - 1931. From 1931 to 1932 he was assistant director of research for Armco Corporation. Dr. Mehl has been associated with the Carnegie Institute of Technology for the past twenty years.

Medal for the Advancement of Research—American Society for Metals

The 1952 ASM Medal for the Advancement of Research will go to Cleo F. Craig, President, American Telephone and Telegraph Company, New York. Founded in 1943 by the American Society for Metals, the Research Medal is based upon these qualifications which Mr. Craig fulfills to a high degree: "The candidate shall be an executive in an industrial organization, the principal activity of which is the production and fabrication of metals. He shall be one who, over a period of years, has consistently sponsored metallurgical research or development, and, by his foresight and influence, in making available financial support, has helped substantially to advance the arts and sciences related to metals."

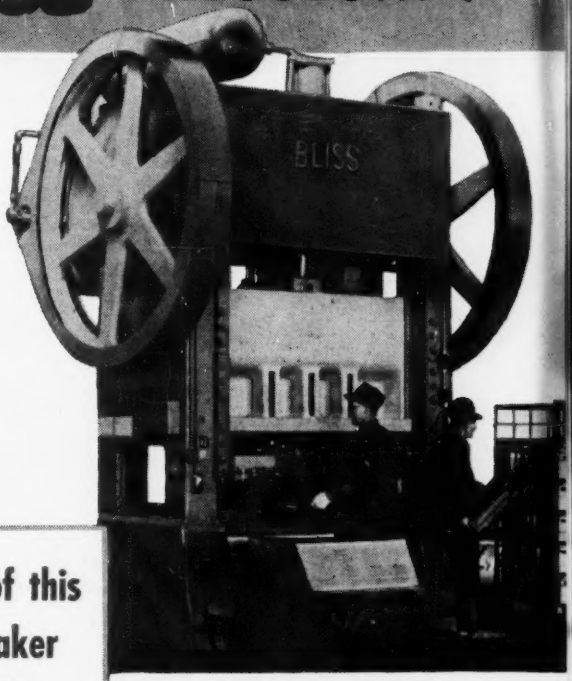


Cleo F. Craig

Metallurgical Research forms an important part of the basic scientific studies carried on by the Bell System for the advancement of electrical communication. Cleo F. Craig, during his long service as an engineer in the Bell System and as an executive in the management and in the operating and engineering activities, has taken keen interest in the improvement and the extension of communication through research. As a member of the Board of Directors of the Bell Telephone Laboratories for eight years and subsequently as President of the American Telephone and Telegraph Company, he has supported and promoted metallurgical research by giving his active encouragement and approval to the laboratory program.

The 1952 ASM Research Medalist is a native of Missouri and received his B.S. and E.E. degrees from the University of Missouri.

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Program of AWS Technical Papers

Technical Sessions at Bellevue-Stratford Hotel

Monday, October 20—10:00 A.M.

Award of Prizes

Adams Lecture

Chairman—Charles H. Jennings, President, AWS

Co-Chairman—H. R. Morrison, Chairman, Convention Committee

The Welding and Brazing of Titanium Alloys—By C. B. Voldrich, Battelle Memorial Institute

Monday, October 20—2:00 P.M.

Three Simultaneous Sessions

Fabricating Procedures

Chairman—F. L. Plummer, Hammond Iron Works

Co-Chairman—H. C. Campbell, Arcos Corporation

Fusion Welding Techniques for Jet Aircraft Components—By Arnold S. Rose and Morton A. Braun, I. T. E. Circuit Breaker Co.

Should Preheat Be Substituted for High Temperature Stress Relief in the Codes?—By E. Paul DeGarmo, University of California

Chromium-Recovery During Submerged-Arc Welding—By James G. Kerr and David A. Elmer, C. F. Braun & Co.

Resistance Welding

Chairman—T. Embury Jones, Precision Welder & Machine Co.

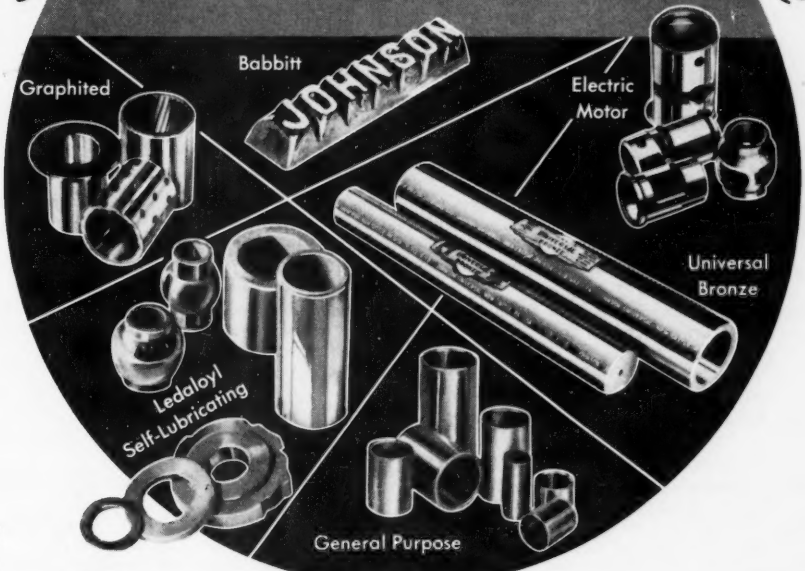
Co-Chairman—J. J. MacKinney, Budd Company

Corrosion of Structural Spot Welds—By B. Karnisky, E. P. Gruca, and E. Kinelski, Pullman-Standard Car Mfg. Co.

Maintenance of Resistance Welders in High Speed Assembly Lines—By James F. Salatin and O. D. Etchison, Delco-Remy Division, General Motors

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Program of AWS Technical Papers—*Continued*

Hard Facing and Flame Hardening

Chairman—E. H. Roper, Air Reduction Sales Company
Co-Chairman—R. A. Guenzel, Southern Oxygen Company

Hard Facing Alloys of the Chromium Carbide Type—By Howard S. Avery and Henry J. Chapin, American Brake Shoe Company

Selection and Evaluation of Methods of Hard Facing—By Jack J. Barry, Air Reduction Sales Company

Flame Hardening of Large Diameter Thin Wall Cylindrical Shells—By G. S. Wing and G. A. Weber, M. W. Kellogg Company

Tuesday, October 21—9:30 A.M.

Three Simultaneous Sessions

Resistance Welding

Chairman—Jack Ogden, Fisher Body Div., General Motors
Co-Chairman—K. W. Ostrom, K. W. Ostrom & Company

Caluculation of Spotweld Properties—By Julius Heuschkel, Westinghouse Electric Corporation

Temperature Distribution During Flash Welding of Steel—Part II—By Ernest F. Nippes, Warren F. Savage, John J. McCarthy, and Sheridan S. Smith, Rensselaer Polytechnic Institute

Spot Welded Titanium-Base Alloy Sheet—By M. L. Begeman and Frank W. McBee, Jr., The University of Texas

Spot Welding Magnesium with Three Phase Low Frequency Equipment—By Dean L. Knight and Paul Thorne, National Electric Welding Machines Co., and Paul Klein, Dow Chemical Company

Weldability

Chairman—R. E. Somers, Bethlehem Steel Company
Co-Chairman—A. B. Gordon, Linde Air Products Co.

Further Studies of the Crack Sensitivity of Aircraft Steels—By A. W. Steinberger and J. Stoop, Curtiss Wright Corp., Propeller Div.

Effect of Geometry on Stresses in Circular Patch Specimen—By Alan V. Levy and Harry E. Kennedy, University of California

Evaluation of the Circular Patch Weld Test—By John E. Hackett and L. O. Seaborn, University of California

Relationship of Welding Technique to Penetration and Dilution—By Clarence E. Jackson and Arthur E. Shrubsall, Union Carbide and Carbon Research Labs.

Structural

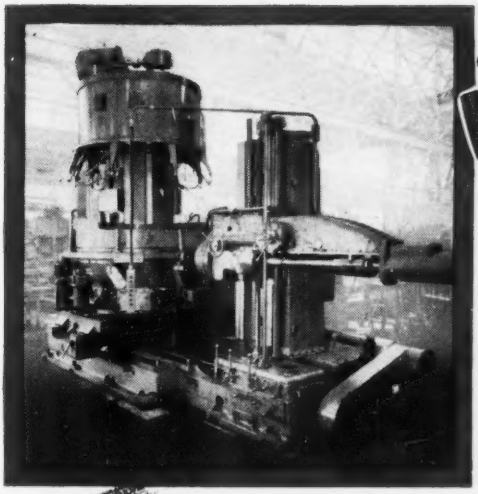
Chairman—LaMotte Grover, Air Reduction Sales Co.
Co-Chairman—I. E. Boberg, Chicago Bridge & Iron Company

The Behavior of Welded Portal Frames—By E. R. Johnston, Lynn S. Beedle, Fritz Engineering Labs., Lehigh Univ., and J. M. Ruzek, C. F. Braun & Co.

Residual Stress and the Compressive Strength of Steel—By Lynn S. Beedle, A. W. Huber, Fritz Engr. Labs., Lehigh Univ., and Bruce G. Johnston, University of Michigan

How to Save Cost by Designing for Structural Welding—By Alfred E. Pearson, The Ingalls Iron Works Company

Distortion Control in Structural Fabrication—By Gordon Cape and Llewellyn Jehu, Dominion Bridge Co., Ltd.



No Trick . . Actual Test

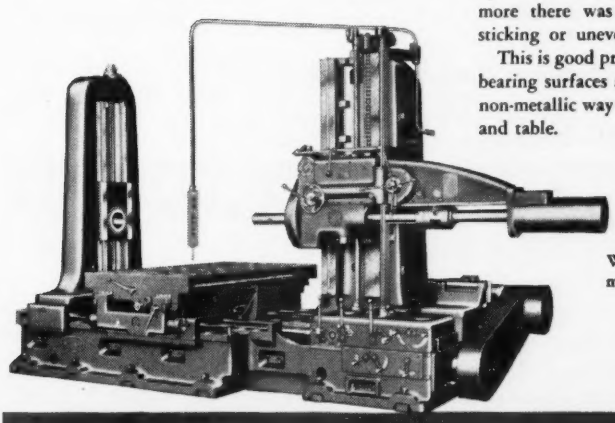
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Program of AWS Technical Papers—*Continued*

Tuesday, October 21—2:00 P.M.

Three Simultaneous Sessions

Weldability

Chairman—E. M. MacCutcheon, Jr., Bureau of Ships, Navy Dept.
Co-Chairman—L. J. Larson, Allis-Chalmers Mfg. Co.

The Effect of Strain Rate on Twinning and Brittle Fracture in Low Carbon Steel—By D. Rosenthal and C. C. Woolsey, Jr., University of California

Interpretation of Test Data Regarding Brittle Strength and Transition Temperature of Structural Steel—By N. M. Newmark and W. C. Heltje, University of Illinois

Factors Affecting the Structural Steel in Repeated Overloading—By Robert D. Stout, John H. Gross, and Dogan Gucer, Lehigh University

Resistance Welding

Chairman—J. H. Cooper, Taylor Winfield Corp.
Co-Chairman—W. G. Fetter, P. R. Mallory & Co.

Quality Control of Resistance Welding by Statistical Methods—By J. F. Radford and R. K. Waldvogel, Crosley Division, Avco Mfg. Corp.

Contact Resistance as Affected by Subdividing the Contact Area—By Wm. B. Kouwenhoven and Clarence W. Little, Jr., Johns Hopkins Univ.

New Multi-Spot Control Provides Increased Welding Production with Limited Power Supply—By Claude R. Whitney, Jr., Square D Company

Brazing and Bronze Welding

Chairman—J. J. Vreeland, Chase Brass & Copper Co.
Co-Chairman—L. H. Hawthorne, Revere Copper & Brass, Inc.

New Aspects in Surface Alloying in Brazing and Related Techniques—By Dr. Robert Humphrey and Rene D. Wasserman, Euctectic Welding Alloys Corp.

Strength Joints to Steel with Aluminum Bronze Filler Metals—By Willis G. Groth, Ampco Metal, Inc.

Tuesday, October 21—4:30 P.M.

Educational Lecture Series

Chairman—Gilbert E. Doan

Inert Gas Metal Arc Welding Processes—By Walter H. Wooding, Philadelphia Naval Shipyard

Wednesday, October 22—9:30 A.M.

Plant Visit

Two Simultaneous Sessions

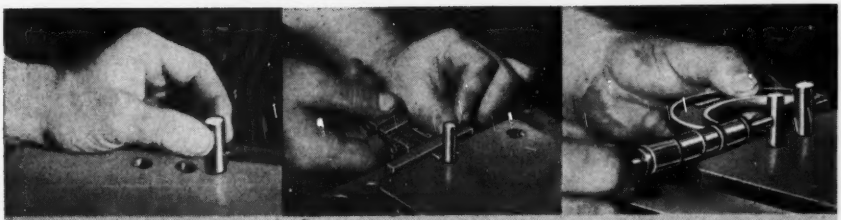
Non-Ferrous

Chairman—O. B. J. Fraser, International Nickel Co.
Co-Chairman—J. R. Hunter, Westinghouse Electric Corp.

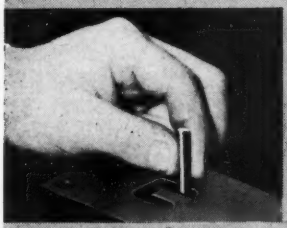
The Semiautomatic Inert-Gas Metal-Arc Welding of Aluminum Alloys—By Charles T. Gayley, Joseph R. Girini, and Walter H. Wooding, Industrial Test Laboratory, Philadelphia Naval Shipyard

Welding 90-10 Cupro-Nickel by the Inert Gas Shielded Arc Processes—By L. H. Hawthorne, Revere Copper and Brass, Inc.

Weld Cracking of Aluminum Alloys—By James D. Dowd, Aluminum Company of America

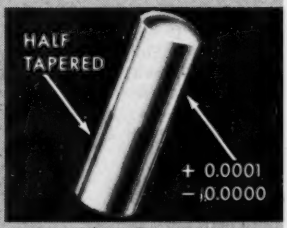


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Program of AWS Technical Papers—*Continued*

Weldability

Chairman—L. C. Bibber, United States Steel Co.
Co-Chairman—R. H. Lambert, Captain, U.S.N.

Relation of Preheating to Low-Temperature Cooling Rate Embrittlement and Microcracking—By A. E. Flanigan and T. Micleu, University of California

Initiation and Propagation of Brittle Fracture in Structural Steels—By Peter P. Puzak, Earl W. Eschbacher, and William S. Pellini, Naval Res. Lab.

The Continuous Cooling Transformation of Weld Heat-Affected Zones—By W. R. Apblett, L. K. Poole, and W. S. Pellini, Naval Research Lab.

The Determination of Optimum Welding Conditions for the Automatic Welding of High Hardenability Steels, With or Without Preheat—By C. R. McKinsey and J. F. Collins, Union Carbide & Carbon Res. Labs., Inc.

Wednesday, October 22—2:00 P.M.

Three Simultaneous Sessions

Weldability

Chairman—R. D. Thomas, Jr., Arcos Corporation
Co-Chairman—C. B. Jenni, General Steel Castings Corporation

Embrittlement of High Strength Ferritic Welds—By Peter P. Puzak and William S. Pellini, Naval Research Laboratory

Temper Brittleness in Low Alloy Weld Metal—By Richard P. Wentworth and Hallock C. Campbell, Arcos Corporation

The Effects of Electrodes and Welding Conditions on the Ductility of Arc Welded Mild Steels—By Ernest F. Nippes and Alexander Lesnewich, Rensselaer Polytechnic Institute

Non-Ferrous

Chairman—G. O. Hoglund, Aluminum Company of America
Co-Chairman—J. S. Douglass, Linde Air Products Co.

The Strength and Ductility of Welds in Aluminum Alloy Plate—By F. M. Howell and F. G. Nelson, Jr., Aluminum Research Laboratories

Factors Which Determine the Performance of Aluminum Alloy Weldments—By W. R. Apblett, C. R. Felmley, and W. S. Pellini, Naval Research Lab.

Welding and Forming of Titanium—By Francis H. Stevenson, Aerojet Engineering Corporation

Maintenance and Gas Cutting

Chairman—H. V. Inskeep, Linde Air Products Company
Co-Chairman—A. M. Garcia, Morris, Wheeler & Co., Inc.

Wear and Operation Problems in Maintenance—By Frank J. Gaydos, United States Steel Company, Gary Works

Effect of Oxygen Cutting on Alloy Steel—By F. C. Saacke, Air Reduction Company, Inc.

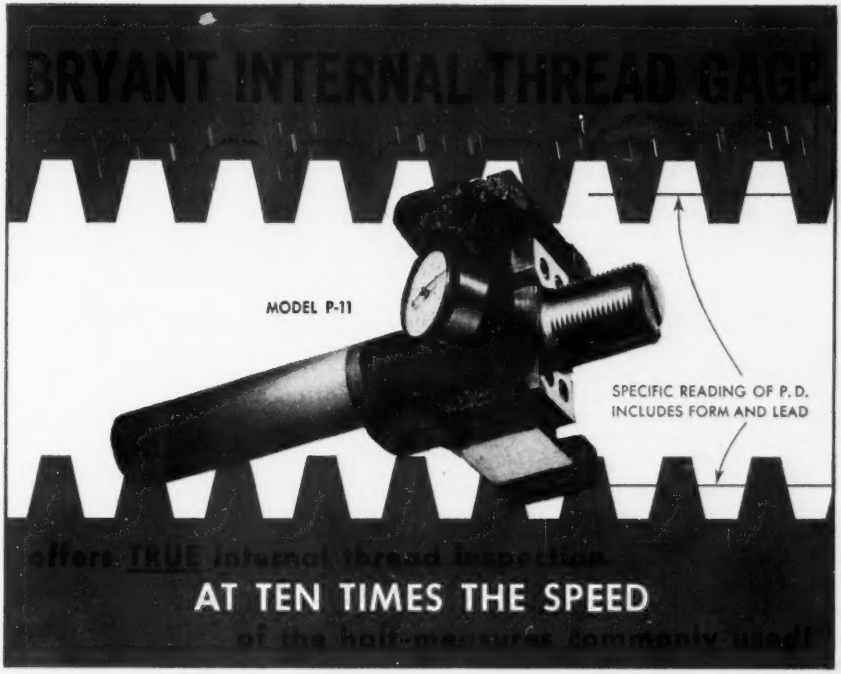
Wednesday, October 22—4:30 P.M.

Educational Lecture Series

Chairman—Gilbert E. Doan

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Program of AWS Technical Papers—*Continued*

Thursday, October 23—9:30 A.M.

Three Simultaneous Sessions

Inert Arc Welding

Chairman—C. I. MacGuffie, General Electric Company

Co-Chairman—K. L. Walker, Foster Wheeler Corporation

A Comparison of Shielding Mixtures for Gas Shielded Arc Welding—By John W. Cunningham, Air Reduction Sales Company

Production Welding of Mild and Low Alloy Steels by Gas Shielded Arc Welding—By John H. Berryman, Air Reduction Sales Company

Porosity in Mild Steel Weld Metal—By Donald Warren, E. L. duPont deNemours & Co., and R. D. Stout, Lehigh University

Brazing

Chairman—A. N. Kugler, Air Reduction Sales Company

Co-Chairman—A. M. Setapen, Handy & Harman

Advanced Information for the Brazing Operator—By E. F. Davis, Westinghouse Electric Corporation

Joint Design for Brazing—By W. J. Van Natten, General Electric Company

Technical Aspects of Soldering Practices—By R. M. MacIntosh, Tin Research Institute, Inc.

Production Brazing—By J. R. Wirt, Delco-Remy Division, General Motors Corp.

Marine Construction

Chairman—David P. Brown, American Bureau of Shipping

Co-Chairman—A. A. Holzbaur, Sun Shipbuilding & Dry Dock Co.

New Rules for Welding Low Alloy Ferritic Pipe Material—By Commander Charles F. Perry, USCG

Evaluation of Brittle Failure Research—By Paul Field and Ed Sweeney, Bethlehem Steel Company

An Investigation on Peening—By G. W. Place, American Bureau of Shipping

Friday, October 24—9:30 A.M.

Three Simultaneous Sessions

Pipe

Chairman—E. R. Seabloom, Crane Company

Co-Chairman—A. J. Erlacher, United Engineers & Constructors

Pipe Welding in the Petroleum Refining Industry—By Albert W. Zeuthen, Socony Vacuum Oil Company

The Arc Welding of Low Chromium Molybdenum Steel Pipe—By J. Bland, L. J. Privoznik, and F. J. Winsor, Standard Oil Co. of Indiana

Effect of Stresses and Stress Relief on the Bursting Strength of Circumferentially Welded Pipe—By L. J. Privoznik and F. J. Winsor, Standard Oil Company of Indiana

Inert Arc

Chairman—C. D. Evans, International Harvester Co.

Co-Chairman—N. E. Wheeler, G.M.C. Truck and Coach Division

Inert Gas Shielding of the Metallic Arc—By William L. Green and Robert J. Krieger, Ohio State University

Gas Flow Requirements for Inert Gas Arc Shielding—By Glenn J. Gibson, Air Reduction Company, Inc.

Shielded Arc Welding of Jet Engine Components—By K. H. Koopman, Linde Air Products Company

Marine Construction

Chairman—H. W. Pierce, New York Shipbuilding Corp.

Co-Chairman—J. Lyell Wilson, Consulting Naval Architect

Observations on Experience with Welded Ships—By David P. Brown, American Bureau of Shipping

Prevention of Marine Corrosion by Metallizing Systems—By Howard Vanderpool, Metallizing Engineering Co.

Failure and Defects Encountered in Welded Ship Construction—By Ralph D. Bradway, New York Shipbuilding Corp.



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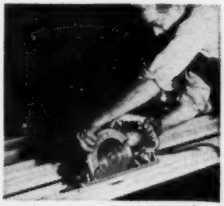
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Ernest O. Kirkendall

Program of AIME Institute of Metals Division

Technical Sessions at Hotel Adelphia

Monday, October 20—9:00 A.M.-12 M.
Crystal Room

Thermodynamic and Thermal Properties

J. P. Nielsen, Chairman; D. J. Blickwede, Secretary

Scaling of Lead in Air—By Elmer Weber, Chase Brass and Copper Co., and W. M. Baldwin, Jr., Case Institute of Technology. Journal of Metals, August 1952

Concentration Dependence of Diffusion Coefficients in Metallic Solid Solutions—By D. E. Thomas, Westinghouse Atomic Power Division, and C. E. Birchenall, Carnegie Institute of Technology. Journal of Metals, August 1952

Thermodynamic Properties of Solid Nickel-Gold Alloys—By L. L. Seigle, Sylvania Electric Products, Inc., M. Cohen, and B. L. Averbach, Massachusetts Institute of Technology

Transformation in Cobalt-Nickel Alloys—By J. B. Hess, Kaiser Aluminum and Chemical Corp,. and C. S. Barrett, University of Chicago. Journal of Metals, June 1952

Principles of Zone-Melting—By W. G. Pfann, Bell Telephone Laboratories. Journal of Metals, July 1952

Segregation of Two Solutes, with Particular Reference to Semiconductors—By W. G. Pfann, Journal of Metals, August 1952

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Program of AIME Institute of Metals Division Papers—*Continued*

Monday, October 20—9:00 A.M.-12 M.
Jefferson Room
High Temperature
L. A. Carapella, Chairman; F. P. Bens, Secretary

Some Observations of Sub Grain Formation During Creep in High Purity Aluminum—By I. S. Servi, Union Carbide & Carbon Corp., J. T. Norton and N. J. Grant, Massachusetts Institute of Technology. Journal of Metals, September 1952

Observations of Creep of the Grain Boundary in High Purity Aluminum—By H. C. Chang and N. J. Grant, Massachusetts Institute of Technology. Journal of Metals, June 1952

Creep Correlations in Alpha Solid Solutions of Aluminum—By O. D. Sherby and J. E. Dorn, University of California. Journal of Metals, September 1952

Effect of Zirconium on Magnesium-Thorium and Magnesium-Thorium-Cerium Alloys—By T. E. Leontis, Dow Chemical Co. Journal of Metals, June 1952

Influence of Chemical Composition on the Rupture Properties at 1200° F. of Wrought Cr-Ni-Co-Fe-Mo-W-Cb Alloys—By E. E. Reynolds, Ailegheny-Ludlum Steel Corp., and J. W. Freeman and A. E. White, University of Michigan. Journal of Metals, September 1952

High Temperature Oxidation of Some Iron Chromium Alloys—By D. Caplan and M. Cohen, National Research Council, Ottawa

Mechanical Properties of Intermetallic Compounds at Elevated Temperatures—By Robert Lowrie, Lewis Flight Propulsion Laboratory

Monday, October 20—2:00 P.M.-5 P.M.
Crystal Room
Research in Progress

(Abstracts of papers to be presented at this session will appear in the October issue of Journal of Metals)

Tuesday, October 21—9:00 A.M.-12 M.
Crystal Room
Symposium on Titanium and Titanium Alloys
M. A. Hunter, Chairman

Tuesday, October 21—9:00 A.M.-12 M.
Jefferson Room
Deformation
T. E. Leontis, Chairman; H. Y. Hunsicker, Secretary

Dynamic Formation of Slip Bands in Aluminum—By N. K. Chen and R. B. Pond, Johns Hopkins University

Observations on the Tension Texture of Aluminum—By E. A. Calnan and Betty E. Williams, National Physical Laboratory. Journal of Metals, July 1952

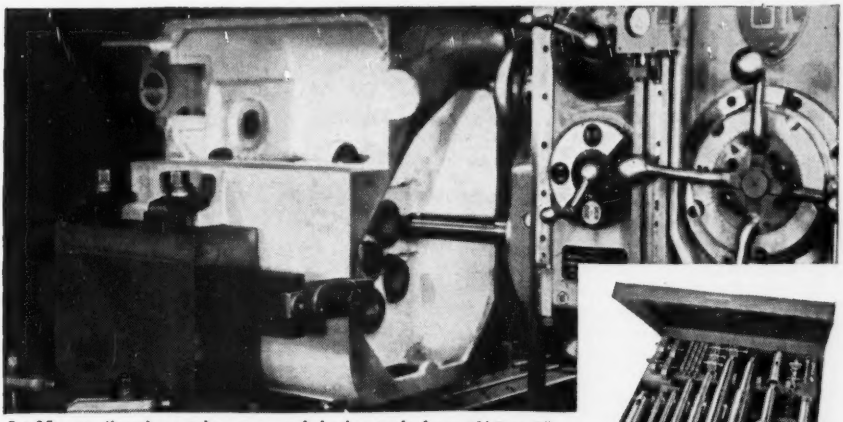
Deformation of Zinc Bicrystals by Thermal Ratcheting—By J. E. Burke and Anna M. Turkalo, General Electric Co. Journal of Metals, June 1952

Surface Effects in the Slip and Twinning of Metal Monocrystals—By J. J. Gilman, and T. A. Read, Columbia University. Journal of Metals, August 1952

Bend Plane Phenomena in the Deformation of Zinc Monocrystals—By J. J. Gilman, General Electric Co., and T. R. Read, Columbia University

Kinking in Zinc Single Crystal Tension Specimens—By Jack Washburn and E. R. Parker, University of California

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Program of AIME Institute of Metals Division Papers—*Continued*

Tuesday, October 21—2:00 P.M.-5:00 P.M.
Crystal Room

Symposium on Titanium and Titanium Alloys (Cont'd.)

Tuesday, October 21—2:00 P.M.-5:00 P.M.
Jefferson Room

Physical Metallurgy

T. A. Read, Chairman; R. L. Fullman, Secretary

Development of Mechanical and Magnetic Hardness in a 10% Vanadium-Cobalt-Iron Alloy—By R. W. Fountain, Union Carbide and Carbon Corp., and J. F. Libsch, Lehigh University

Observations on Nodular Graphite—By H. M. Weld, R. L. Cunningham, and F. W. C. Boswell, Department of Mines and Technical Surveys. Journal of Metals, July 1952

Recrystallization Kinetics of Low Carbon Steel—By S. F. Reiter, General Electric Co. Journal of Metals, September 1952

Effect of Molybdenum and of Nickel on the Rate of Nucleation and the Rate of Growth of Pearlite—By R. W. Parcel, Rem-Cru Titanium, Inc., and R. F. Mehl, Carnegie Institute of Technology. Journal of Metals, July 1952

Effect of Applied Stress on the Martensitic Transformation—By S. A. Kulin, Westinghouse Atomic Power Division, and M. Cohen, and B. L. Averbach, Massachusetts Institute of Technology. Journal of Metals, June 1952

A Study of Grain Shape in an Aluminum Alloy and Other Applications of Stereoscopic Microradiography—By W. M. Williams, Revere Copper and Brass Co., and C. S. Smith, University of Chicago. Journal of Metals, July 1952

Wednesday, October 22—2:00 P.M.-5:00 P.M.
Crystal Room

Titanium

J. E. Burke, Chairman; E. S. Greiner, Secretary

Titanium-Chromium Phase Diagram—By F. B. Cuff, N. J. Grant, and C. F. Floe, Massachusetts Institute of Technology. Journal of Metals, August 1952

Titanium-Copper Binary Phase Diagram—By A. Joukainen, E. I. du Pont de Nemours & Co., Inc., and N. J. Grant and C. F. Floe, Massachusettsi Institute of Technology. Journal of Metals, July 1952

Titanium-Aluminum System—By E. S. Bumps, H. D. Kessler, and M. Hansen, Armour Research Foundation of Illinois Institute of Technology. Journal of Metals, June 1952

Observations on the Lattice Parameters of the Alpha and TiO Phases in the Titanium-Oxygen System—By W. Rostoker, Armour Research Foundation of Illinois Institute of Technology. Journal of Metals, September 1952

Nature of the Line Markings in Titanium and Alpha Titanium Alloys—By C. M. Craighead, G. A. Lenning, and R. I. Jaffee, Battelle Memorial Institute. Journal of Metals, October 1952

Time-Temperature-Transformation Characteristics of Titanium-Molybdenum Alloys — By D. J. DeLazaro, M. Hansen, R. E. Riley, and W. Rostoker, Armour Research Foundation of Illinois Institute of Technology. Journal of Metals, March 1952

Compression Texture of Iodide Titanium—By D. N. Williams, and D. S. Eppelsheimer, Missouri School of Mines and Metallurgy. Journal of Metals, June 1952

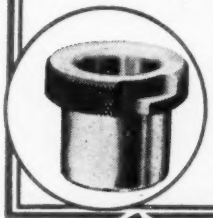
Partial Titanium-Vanadium Phase Diagram—By Paul Pietrokowsky, and Pol Duwez, California Institute of Technology. Journal of Metals, June 1952



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Wednesday, October 22—2:00 P.M.-5:00 P.M.
Jefferson Room

Constitutional Diagrams

B. H. Alexander, Chairman; E. J. Dofter, Secretary

Tungsten-Cobalt-Carbon System—By Pekka Rautala, and J. T. Norton, Massachusetts Institute of Technology

Role of the Binder Phase in Cemented Tungsten Carbide-Cobalt Alloys—By Joseph Garland, Firth Sterling Steel & Carbide Corp., and J. T. Norton, Massachusetts Institute of Technology. Journal of Metals, October 1952

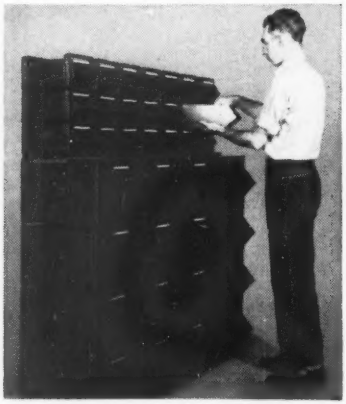
Solubility of Carbon and Oxygen in Molybdenum—By W. E. Few, and G. K. Manning, Battelle Memorial Institute. Journal of Metals, March 1952

System Molybdenum Boron and Some Properties of the Molybdenum Borides—By Robert Steinitz, Ira Binder, and David Moskowitz, American Electro Metal Corp. Journal of Metals, September 1952

Systems Zirconium-Molybdenum and Zirconium-Wolfram—By R. F. Domagala, D. J. McPherson, and M. Hansen, Armour Research Foundation of Illinois Institute of Technology. Journal of Metals, October 1952

Copper-Zinc Constitution Diagram Redetermined in the Vicinity of the Beta Phase by Means of Quantitative Metallography—By Lilian Beck, and C. S. Smith, University of Chicago. Journal of Metals, October 1952

Intermediate Phases in the Mo-Fe-Co, Mo-Fe-Ni, and Mo-Ni-Co Ternary Systems—By D. K. Das, Notre Dame University, S. P. Rideout, E. I. du Pont de Nemours Argonne National Laboratory, and P. A. Beck, University of Illinois



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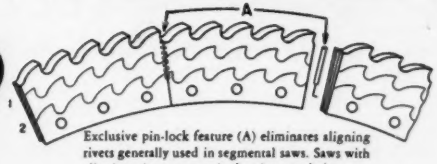
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Program of SNT Technical Papers

Technical Sessions at Hotel Sylvania

Monday Morning, October 20

Lowering Production Costs with Modern X-Ray Equipment

The General Electric Industrial Betatron—By T. W. Dietze, General Engineering Laboratory, General Electric Co.

Modern Techniques in Precision High-Voltage Radiography—By E. Alfred Burrill, High-Voltage Engineering Corp.

Uses of Low-Voltage X-Ray Tubes With Thin Beryllium Windows in Nondestructive Testing—By Tom H. Rogers, Machlett Laboratories

The Current Status of the Picker-Polaroid Process for One-Minute Radiography in the Industrial Field—By W. B. Pyle, Picker X-Ray Corp.

Alternate: Direct Exposure Enlargement Techniques in Radiography and Fluoroscopy Utilizing Fractional-Focus X-Ray Tubes—By Leo C. Kotraschek, North American Phillips Co., Inc.

Monday Afternoon, October 20

New Techniques for Applying X-Ray Nondestructive Tests

Reduction of Exposure Time in Gamma Radiography—By J. J. Hirschfield and D. T. O'Connor, Naval Ordnance Laboratory

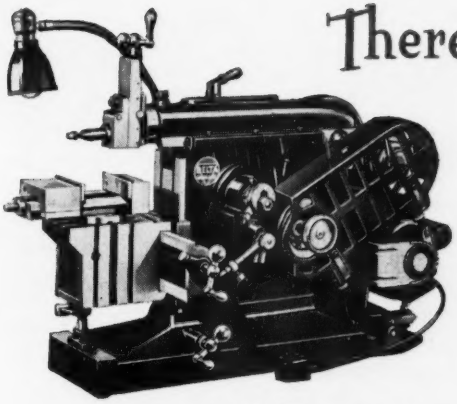
Techniques Used in Measuring Uniformity of Materials by Means of Gamma Radiation—By Lawrence R. Megill and John N. Harris, Los Alamos

Some Industrial Applications of Micro-Radiography—By S. Goldspiel and F. Bernstein, New York Naval Shipyard

Gaging Tin Coatings in the Steel Industry by X-Ray Fluorescence Analysis—By C. J. Woods, North American Phillips Co., Inc.

Alternate: Application of Fluorescence X-Rays to Metallurgical Microradiography—By Herman E. Seeman and H. R. Splettstosser, Eastman Kodak Co.

Alternate: Radiography With Iridium 192—By James V. Rigbey, Ford Motor Co. of Canada



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Program of SNT Technical Papers—*Continued*

Tuesday Morning, October 21

Control and Interpretation in X-Ray Nondestructive Testing

Film Characteristics as Applied to Radiation Monitoring—By George Corney, Eastman Kodak Co.

Problems of Mechanical Film Development—By Donald F. Hauptman and Gerold H. Tenney, Los Alamos

Various Penetrameter Types and Their Limitations—By Norman C. Miller and Gerold H. Tenney, Los Alamos

Interpretation of Radiographs of Aluminum and Magnesium Castings—By J. J. Pierce, Naval Ordnance Laboratory

Interpretation of Fluoroscopic Images of Aluminum and Magnesium Castings—By D. T. O'Connor and D. Polaasky, Naval Ordnance Laboratory

Alternate: Semi-Empirical Equation for the Spectral Energy Distribution in X-Ray Beams—By Charles R. Emigh, Los Alamos

Tuesday Afternoon, October 21

The Economics of Nondestructive Testing to Lower Production Costs

Economic Factors in Nondestructive Testing—By W. E. Thomas, Vice-President, Magnaflux Corp.

Quality Control Application of Nondestructive Tests in the Airframe Industries Which Will Effectively Lower Production Costs—By B. W. Clawson, Quality Manager, Douglas Aircraft, Inc.

The Use of Nondestructive Test Methods in Heavy Manufacture—By James A. Pratt, Metallurgical Engineer, Westinghouse Electric Corporation.

Alternate: Economics of Nondestructive Testing in European Industry—Speaker to be announced

Tuesday Evening, October 21

Annual Officers' Reception and Social Meeting

Wednesday Morning, October 22

New Methods and Applications of Ultrasonic Nondestructive Tests To Lower Industrial Production Costs

An Evaluation of New Immersion Ultrasonic Testing Techniques—By Leslie W. Ball, U. S. Naval Ordnance Test Station

Ultrasonic Examinations of Weldments and the Establishment of Safe Acceptable Limits for Defects—By Frank C. Parker, Carbide and Carbon Chemicals Co.

Ultrasonic Equipment for High-Precision Thickness Measurements—By Peter K. Bloch, Vice-President, Branson Instrument Co.

Geogphysics—Its Relation to Nondestructive Testing—By Peter Dehlinger and Sam Wenk, Battelle Memorial Institute

Alternate: Economic Industrial Applications of the Metroscope—By Mr. Mann, Walter Kidde and Co.

Alternate: Future Trends in Industrial Ultrasonic Testing—By William I. Bendz, Sperry Products, Inc.

Wednesday Afternoon, October 22

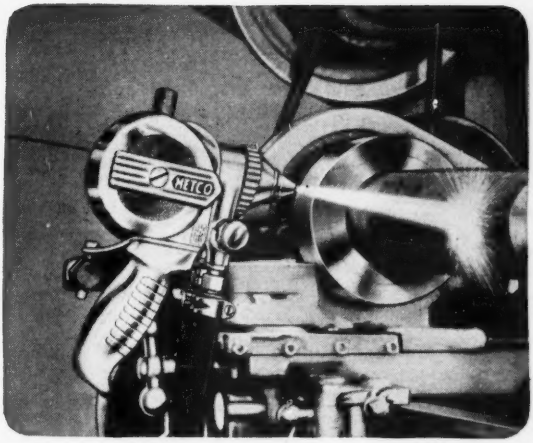
New Electromagnetic Nondestructive Tests to Lower Production Costs

Industrial Evaluation of Search Coil Flaw Detection Techniques—By Carleton E. Hastings, Watertown Arsenal

A Metal Comparator for the Inspection and Classification of Metals—By B. M. Smith, General Engineering Laboratory, General Electric Co.

The Application of Foerster-Type Instruments in American Industry—By Representative of Magnaflux Corporation

Alternate: New Nondestructive Test Instruments Developed by the Institut-fur-Dr. Foerster — By Friedrich Foerster, Institut-fur-Dr. Foerster, Germany



now a really low-cost metallizing installation...

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New, low, compressed-air requirements . . . only 10 cfm at 40 to 60 psi, already available in many shops, or supplied by inexpensive 3 hp compressor . . . bring metallizing within reach of the small user.



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Metallizing protective coating on steel plate

Here's a chance for the smaller maintenance shop to get into profitable metallizing operations like these:

- Save up to 90% of replacement costs on machine repair jobs,
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Free Bulletin or Shop Demonstration—Send off the coupon for the detailed information Bulletin 55 gives you. Or, better still, ask for a demonstration in your own shop by a Metco Field Engineer. He'll be glad to show you how the new Metco L-Gun works on some job of your own. No obligation, of course.



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Company_____
Address_____
City_____ Zone_____ State_____

Thursday Morning, October 23

Using Liquid-Penetrant and Electrical Nondestructive Test Methods To Lower Industrial Production Costs

Comparison of Materials for Liquid Penetrant Inspection—By Hamilton Migel and Taber de Forest, Magnaflux Corporation

Lowering Production Costs With Dy-Chek and Chek-Spek Dye Penetrants—By Representative of Turco Products, Inc.

The Application of Wire-Resistance Strain Gages to Lower Production Costs—By Francis G. Tatnall, Baldwin-Lima-Hamilton Corporation

Alternate: The Measurement of Ionization in Dielectric Structures—a New Nondestructive Test for Electrical Insulating Materials—By D. A. Lupfer, General Electric Co.

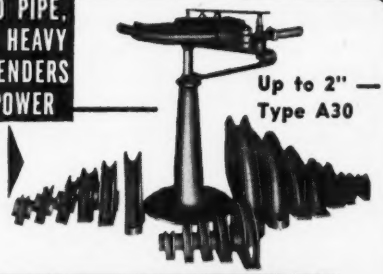
Thursday Afternoon, October 23

Mehl Honor Lecture and Annual Business Meeting

Society for Nondestructive Testing Annual Lecture Honoring Dr. Robert F. Mehl—By Donald T. O'Connor, Chief, Radiology Section, Naval Ordnance Laboratory

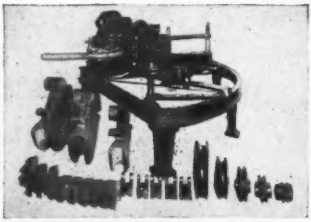
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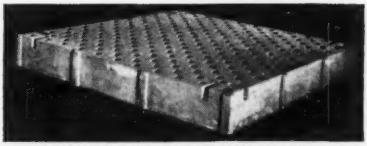


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bending cold pipe from ¼" to 6" I.P.S. inclusive

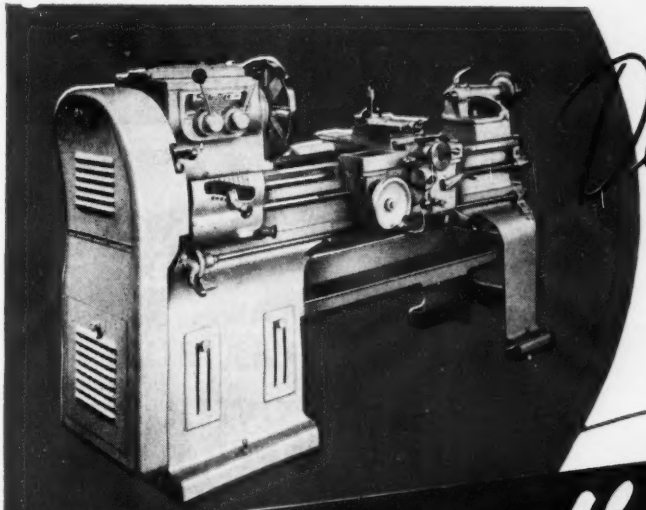


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Sebastian Lathes invite comparison. Latest literature gives features you should check *in any lathe*, before making a decision. Write for catalog.

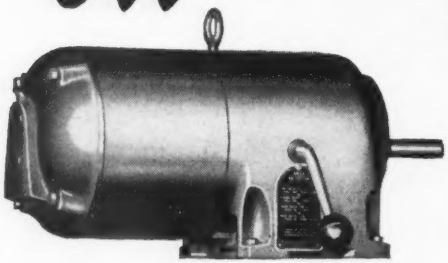
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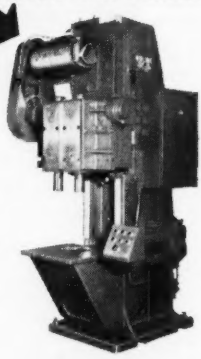
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List of Exhibitors

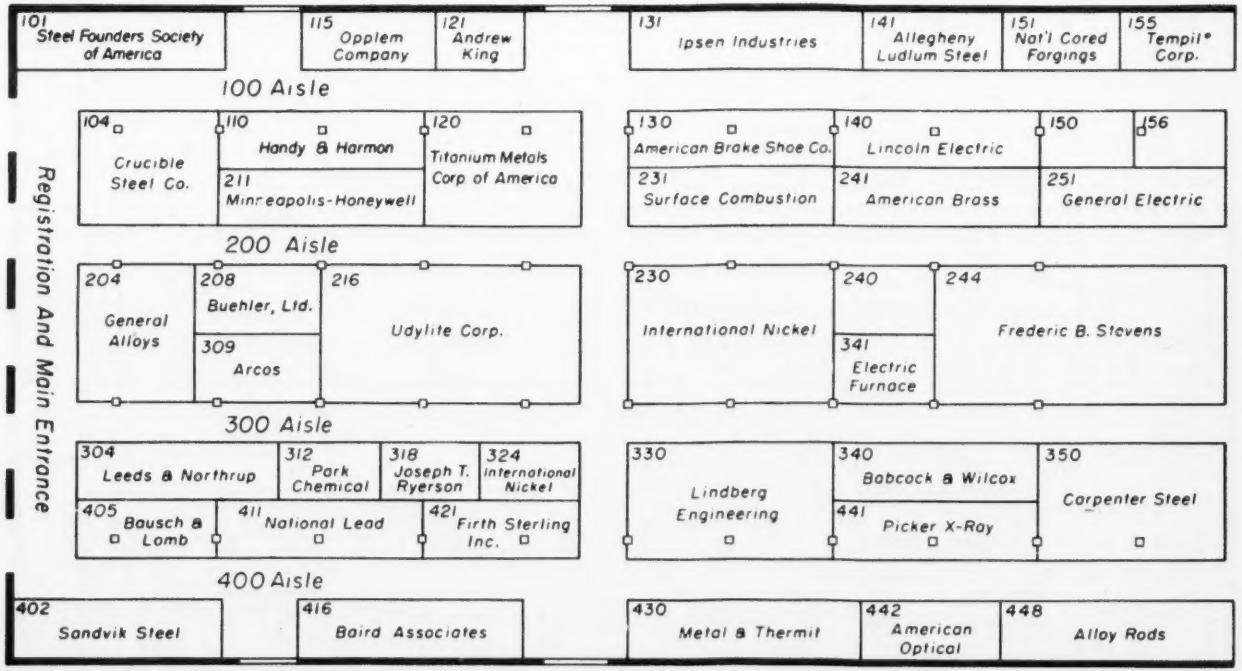
Company	Booth
A	
A. B. C. Die Casting Machine Co.	1563
ACCO Steel Casting Div.	706
Acme Manufacturing Co.	1716
Acme Steel Company	1977
Air Products Inc.	1662
Air Reduction Sales Co.	1623
Ajax Electric Co., Inc.	624
Ajax Electrothermic Corp.	624
Ajax Engineering Corp.	624
Ajusto Equipment Co.	1376
Allegheny Ludlum Steel Corp.	141
Allen Manufacturing Co.	1825
Allied Chemical & Dye Corp.	1019
Allison Company	1409
Alloy Engineering & Casting Co.	507
Alloy Metal Wire Co., Inc.	550
Alloy Rods Co.	448
Alpha Metals, Inc.	1862
Alvey-Ferguson Co.	530
American Brake Shoe Co.	130
American Brass Co.	241
American Chain & Cable Co., Inc.	706
American Cyanamid Co.	1344
American Cystoscope Makers	242
American Gas Association	1601, 1910
American Gas Furnace Co.	1701, 1601, 1910
American Machine & Foundry Co.	1124
American Machine and Metals	1239
American Machinist	1263
American Manganese Steel Div.	130
American Metal Market	1871
American Metaseal Corp	1138
American Nickeloid Co.	1378
American Non-Gran Bronze Co.	1946
American Optical Co.	442
American Platinum Works	1972
American Pullmax Company, Inc.	1449
American Silver Co., Inc.	709
American Society for Metals Philadelphia Chapter	1018
American Society for Metals National Office	1619
American Wheelabrator & Equip.	1749
Ampco Metal, Inc.	1217
Amplex Mfg. Co.	1954
Ansco Division	929
Applied Research Laboratories	1757
Aircair Co.	1132
Arcos Corporation	309
Aronson Machine Co.	718
Arwood Precision Casting	1758
Atlas Press Co.	602
Atomic Energy of Canada Ltd.	1479
Automatic Temperature Control Co., Inc.	1768
Automotive Industries	1468
Avon Tube Div.	1961

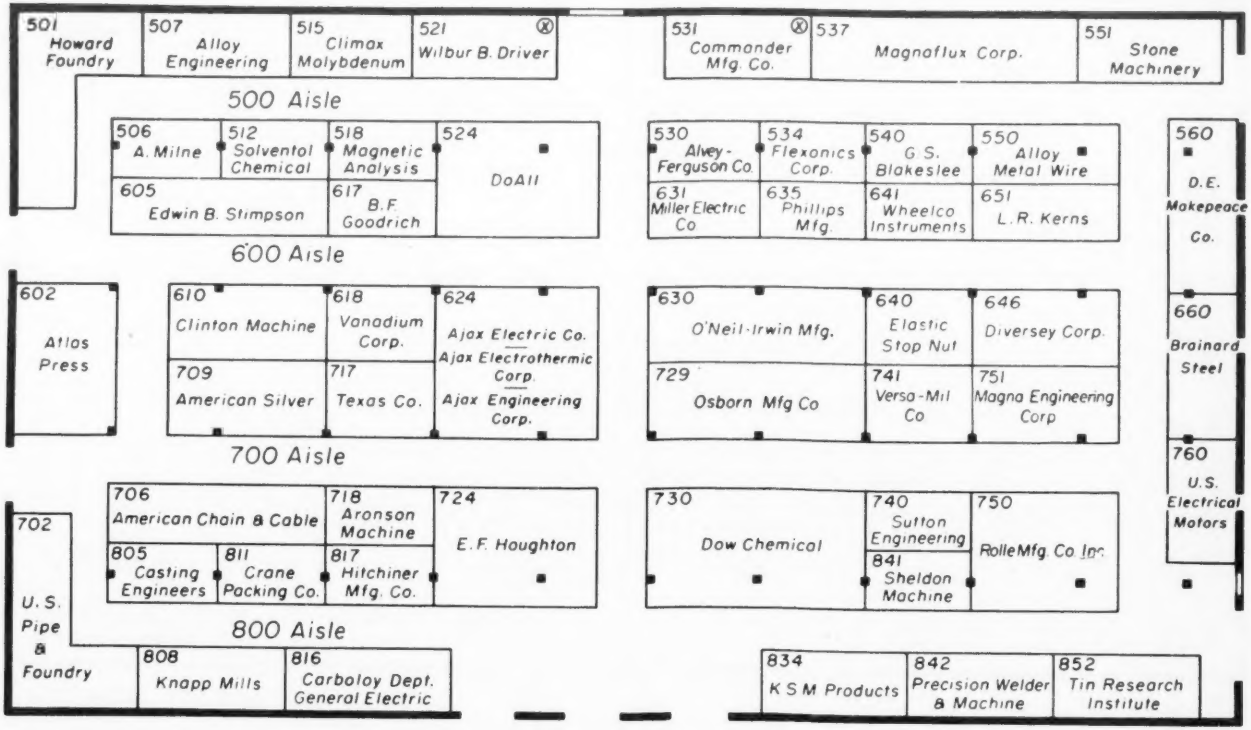
Company	Booth
B	
Babcock & Wilcox Co.	340
Baird Associates, Inc.	416
Baker & Co., Inc.	1210
Baldwin-Lima-Hamilton Corp.	1520
Barber-Colman Co.	641
Bausch & Lomb Optical Co.	405
Bell & Gossett Co.	1772
Bendix-Westinghouse Automotive Air Brake Company	1710
Beryllium Corporation	1539
Black Drill Co.	1350
Blackstone Mfg. Co., Inc.	1382
Blakeslee & Co., G. S.	540
Bowser Inc.	1658
Brainard Steel Div.	660
Bridgeport Brass Co.	1035
Bruning Co., Chas.	1440
Brush Development Co.	1358
Buck Tool Co.	905
Buehler, Ltd.	208
Bundy Tubing Co.	1839
C	
Cam-Lok Division	1116
Campbell Div., Andrew C.	706
Carboloy Department	816
Carlin Co., Inc., J. A.	1310
Carpenter Steel Co.	350
Casting Engineers, Inc.	805
Challenge Machinery Co.	932
Chase Brass & Copper Co.	1220
Chem-Fin Corp.	1730
Chicago Metal Hose Corp.	534
Chilton Co., Inc.	1468
Chicago Rivet	1819
Chicago Tool & Engineering Co.	1023
Chrysler Corp.	1954
Cincinnati Milling Machine Co.	1610
Cities Service Oil Co.	1309
Climax Molybdenum Co.	515
Clinton Machine Co.	610
Coles Cranes, Inc.	1369
Collins Micro-Flat Co.	1281
Commander Manufacturing Co.	531
Commercial Shearing and Stamping Co.	1616
Continental Industrial Engineers Inc.	1601, 1910
Continental Tooling Service, Inc.	1027
Cooper Metallurgical Laboratories	923
Crane Packing Co.	811
Crucible Steel Co. of America	104
Curtis Machine Div.	937
D	
Dake Engine Co.	1761
Deepfreeze Distributing Corp.	1320
Delaware Tool Steel Corp.	1275

(*Continued on Page 234*)

Floor Plan of Arena

ON this and the succeeding four pages are the floor plans of the exhibit area provided at the Philadelphia Convention Hall for the National Metal Congress and Exposition. The Arena area shown on this page is located directly above the Exhibition Hall on the following page. These two areas are conveniently connected by ramps and stairways.

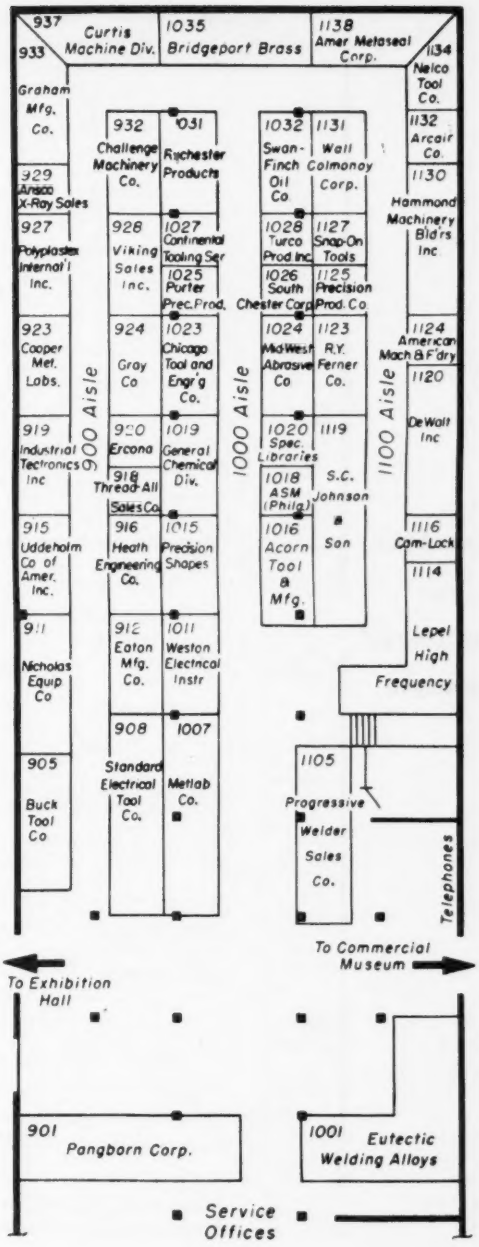




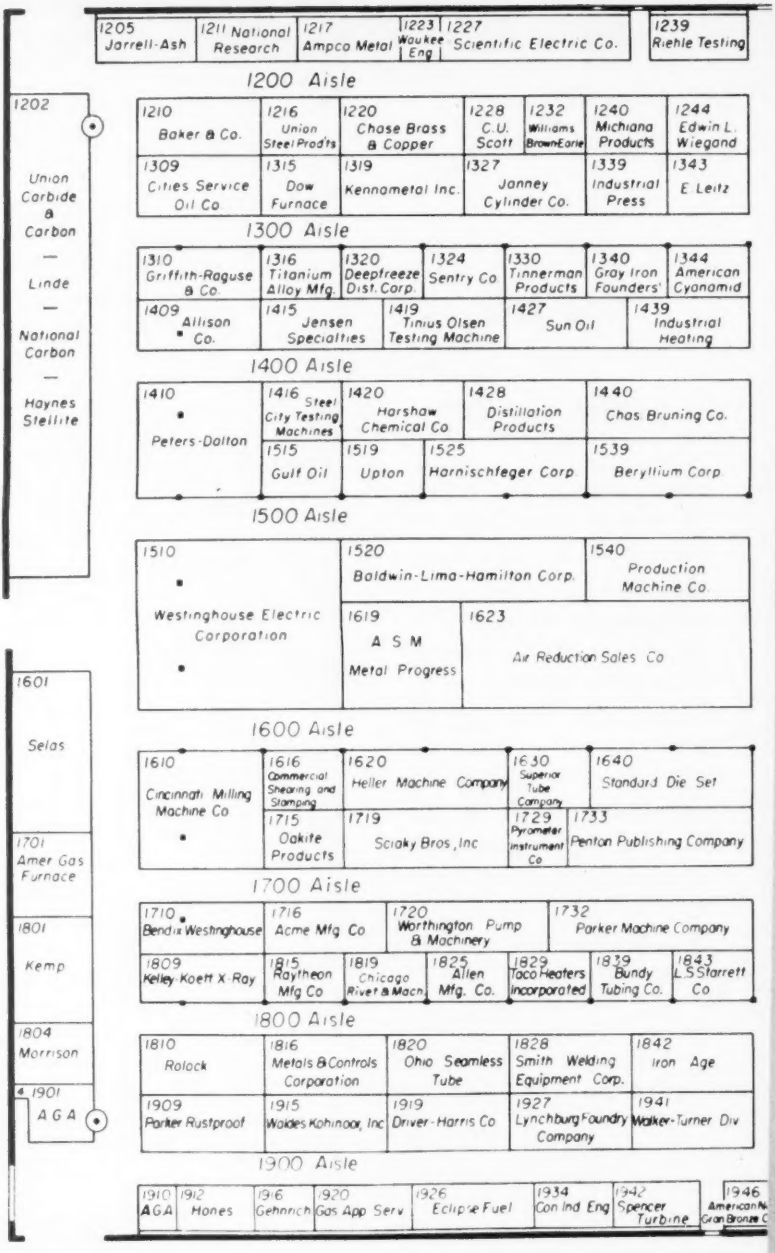
Floor Plan of Exhibition Hall

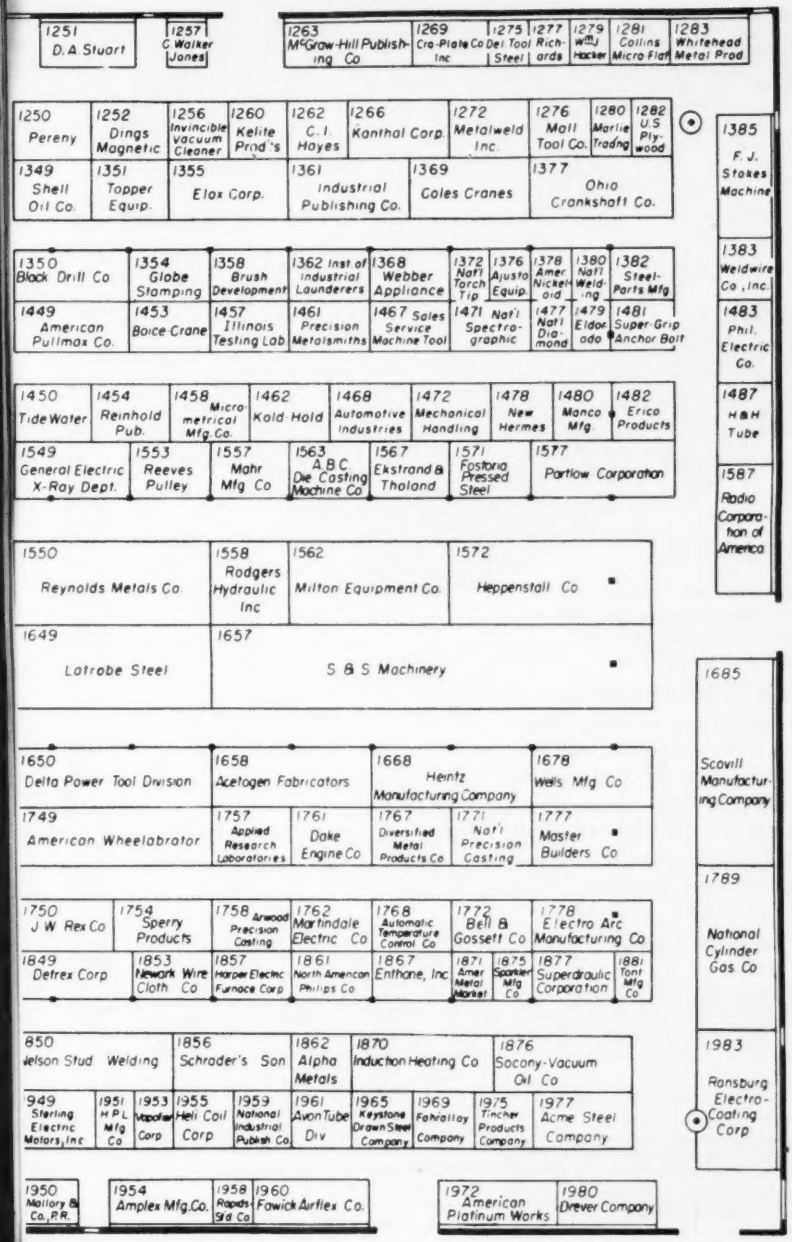
Floor Plan of Center Building

THE floor plans for the 34th National Metal Exposition at the Philadelphia Convention Hall are shown on pages 229 thru 233. The exhibits this year are designed to bring together the experience, the knowledge and the means for a more effective use of metals in the making of products for civilian use, and for the making of products that will insure our defense against aggression, and thus guarantee our security and liberty.



Floor Plan of Commercial Museum





Floor Plan of Commercial Museum

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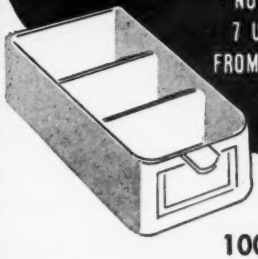
(*Continued from page 228*)

Company	Booth
Delta Power Tool Division	1650
DeSanno, O. F.	1252
Detrex Corporation	1849
DeWalt, Inc.	1120
Diamond Iron Works, Inc.	1557
Distillation Products Industries	1428
Diversey Corporation	646
Diversified Metal Products Co.	1767
DoAll Company	524
DoAll Philadelphia Company	524
Dow Chemical Co.	730
Dow Furnace Company	1315
Drever Company	1980
Driver Co., Wilbur B.	521
Driver-Harris Company	1919
E	
East Shore Machine Co.	1455
Eaton Manufacturing Co.	912
Eclipse Fuel Engineering Co.	1926, 1601, 1910
Ekstrand & Tholand, Inc.	1567
Elastic Stop Nut Corp. of America	640
Eldorado Mining & Refining Ltd.	1479
Electric Furnace Company	341
Electro-Alloys Div.	130
Electro Arc Manufacturing Co.	1778
Elox Corp. of Michigan	1355
Empire Products, Inc.	1116
Engineered Castings Div.	130
Enthone, Inc.	1867
Ercona Corp.	920
Erico Products, Inc.	1482
Esbenson Co., Iver J.	916
Eutectic Welding Alloys Corp.	1001
F	
Fahralloy Company	1969
Fawick Airflex Co., Inc.	1960
Ferner Co., Inc., R. Y.	1123
Firth Sterling, Inc.	421
Flexonics Corporation	534
Fostoria Pressed Steel Corp.	1571
G	
Gas Appliance Service, Inc.	1920, 1601, 1910
Gehnrich & Gehnrich	1916, 1601, 1910
General Alloys Co.	204
General Aniline & Film Corp.	929
General Chemical Division	1019
General Electric Co.	
Apparatus Sales Div.	251
Carboloy Div.	816
X-Ray Dept.	1549
Globe Stamping Div.	1354
Goodrich Company, B. F.	617
Graham Mfg.	933
Gray Company, Inc.	924
Gray Iron Founders' Society, Inc.	1340
Gregory Industries, Inc.	1850
Griffith-Raguse & Co., Inc.	1310
Gulf Oil Corp.	1515

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Company	Booth
H	
H & H Tube & Mfg. Company	1487
H P L Manufacturing Company	1951
Hacker & Co., Inc., Wm. J.	1279
Handy & Harman	110
Hammond Machinery Builders, Inc.	1130
Harnischfeger Corp.	1525
Harper Electric Furnace Corp.	1857
Harshaw Chemical Co.	1420
Hayes, Inc., C. I.	1262
Haynes Stellite Co.	1202
Heath Engineering Co.	916
Heintz Manufacturing Co.	1668
Heli-Coil Corporation	1953
Heller Machine Company	1620
Heller Maschinenfabrik, Gebr.	1620
Heppenstall Company	1572
Higbie Mfg. Company	1961
Hitchiner Mfg. Co.	817
Hones, Inc., Charles A.	1912, 1601, 1910
Houghton & Co., E. F.	724
Howard Foundry Company	501
Hupp Corp.	1354
I	
Illinois Testing Laboratories	1457
Induction Heating Corp.	1870
Industrial Heating Equipment	1439
Industrial Press	1339
Industrial Publishing Co.	1361
Industrial Tectonics, Inc.	919
Industry & Welding	1361
Institute of Industrial Launderers	1362
International Nickel Co., Inc.	230, 324
Invincible Vacuum Cleaner Mfg.	1256
Ipsen Industries, Inc.	131
Iron Age	1842
J	
Janney Cylinder Company	1327
Jarrell-Ash Company	1205
Jensen Specialties, Inc.	1415
Johnson & Son, Inc., S. C.	1119
Jones Company, C. Walker	1257
K	
K S M Products, Inc.	834
Kanthal Corporation	1266
Kearney & Trecker Corp.	1941
Kelite Products, Inc.	1260
Kelley-Koett X-Ray Corp.	1809
Kemp Manufacturing Co., C. M.	1801, 1601, 1910
Kennametal Inc.	1319
Kerns Company, L. R.	651
Keystone Drawn Steel Company	1965
King, Andrew	121
Knapp Mills Incorporated	808
Kold-Hold Manufacturing Co.	1462
L	
Latrobe Steel Company	1649
Leeds & Northrup Company	304
Leitz, Inc., E.	1343



Got a problem?

You should use Chicago "Safety Plus" Screws in Standard Listed Sizes

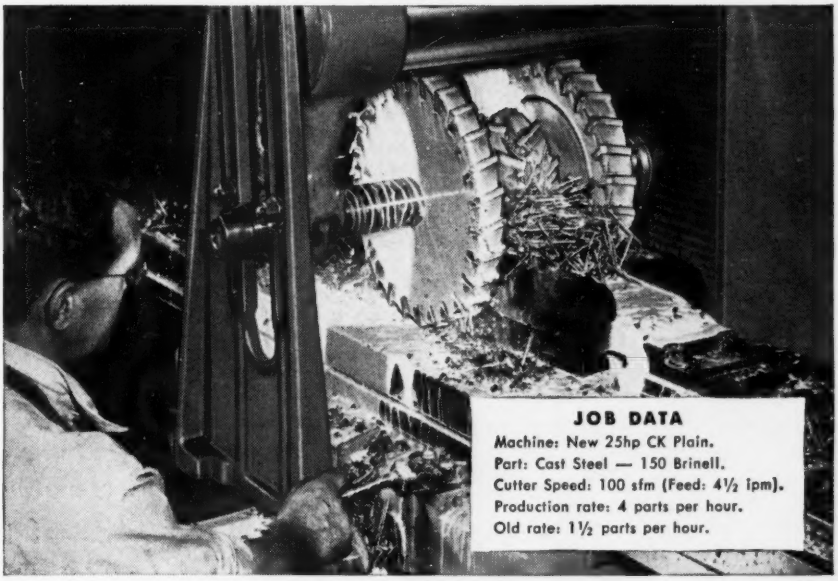
They fasten products more securely, give a tighter hold for a neater appearance, and our three quarters of a century of experience in making fine threaded products guarantees a consistently more uniform accuracy to create sharper, smoother threads for a quicker, easier fit. They save money, too, because fewer screws and a faster fit means LOWER COSTS all down the line. Call the INDUSTRIAL SUPPLY DISTRIBUTOR nearest you today. Ask him for Chicago and get "Safety Plus"

- Socket Screws
- Cap and Set Screws
- Nuts • Taper Pins • Studs

the Chicago SCREW COMPANY
2505 WASHINGTON BLVD.
BELLWOOD, ILL.

FACTS TELL THE STORY...

NEW CK MILLING MACHINE PAYS USER BIG PRODUCTION DIVIDEND



CK Milling Machine Features that helped do this job BETTER

- Greater Rigidity of new CK column easily absorbed vibration from heavy cutting load. Only single pass needed for each part.
- Smoother Feed of CK's large (2" dia.) screw and extra-long table feed nut permitted heavy cut.
- No. 60 heavy-duty drive flange around spindle nose permitted use of extra-rigid, large-diameter arbor on multiple cutter setup.
- CK's positive, metered, pressure and automatic lubrication to all parts assured wear-free operation regardless of cutting load.
- 24 different spindle speeds (13 to 1300 rpm) plus 32 different table feeds (3⅛" to 90 ipm) meant operator selected exact combination to get fullest advantage from high horsepower and modern cutting tools.
- Greater Horsepower of CK machine meant maximum results from modern cutting tools.
- CK's 3-bearing spindle and flywheel assured fastest metal removal with desired finish in single pass.

Investigate the new CK line of milling machines. Every feature is job and test proven to give you cost-cutting results, plus greater productivity—better finished products. Contact our nearest representative or write: Kearney & Trecker Corp., 6734 West National Avenue, Milwaukee 14, Wisconsin.

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

Company	Booth
Lepel High Frequency Lab.	1114
Lincoln Electric Company	140
Lincoln Park Industries, Inc.	937
Lindberg Engineering Company	330
Linde Air Products Co.	1202
Lynchburg Foundry Company	1927

M

Machinery	1339
Magna Engineering Corp.	751
Magnaflux Corporation	537
Magnetic Analysis Corporation	518
Mahr Mfg. Co.	1557
Makepeace Company, D. E.	560
Malayan Tin Bureau	858
Mall Tool Company	1276
Mallory & Company, Inc., P. R.	1950
Manco Manufacturing Co.	1480
Marlie Trading, Inc.	1280
Martindale Electric Co.	1762
Master Builders Company	1777
Materials Methods	1454
McGraw-Hill Book Co.	1263
McGraw-Hill Publishing Co., Inc.	1263
Mechanical Handling Systems, Inc.	1472
Metal Products Sales Co.	817
Metal Progress	1619
Metal and Thermit Corp.	430
Metallurgical Lab., Inc.	1007
Metals and Controls Corp.	1816
Metals Review	1619
Metalweld, Inc.	1272
Metlab Co.	1007
Michiana Products Corp.	1240
Micrometrical Manufacturing Co.	1458
Mid-West Abrasive Co.	1024
Miller Electric Mfg. Co.	631
Milne and Company, A.	506
Milton Equipment Co.	1562
Minneapolis-Honeywell Reg. Co.	211
Morrison Industries, Inc.	1804, 1601, 1910
Morton Gregory Corp.	1850

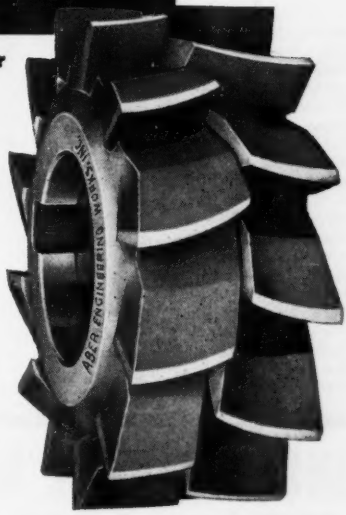
N

National Bearing Division	130
National Carbon Co.	1202
National Cored Forgings Company	151
National Cylinder Gas Company	1989
National Diamond Laboratory	1477
National Industrial Publishing	1959
National Lead Company	411
National Precision Castings Co.	1771
National Research Corporation	1211
National Spectrographic Labs. Inc.	1471
National Torch Tip Company	1372
National Welding Supply Assn.	1380
Nelco Tool Co., Inc.	1134
Nelson Stud Welding Division	1850
New Hermes Engraving Machine	1478
Newark Wire Cloth Company	1853
Nicholas Equipment Co.	911
North American Philips Co., Inc.	1861



OVER 20,000
and Still Going Strong

...With An Aber Curved Tooth Milling Cutter

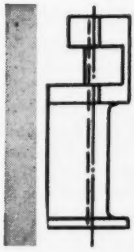


Objectional chatter marks from standard type cutters surprisingly resulted in increasing production from 4,000 to 20,000 pieces per grind

Eight months ago a manufacturer experienced difficulty in obtaining a smooth surface on a side milling operation while using standard type cutters.

Aber "Curved Tooth" right and left hand shear side milling cutters were recommended to eliminate chatter marks. NO THOUGHT WAS GIVEN TO INCREASING PRODUCTION.

The results proved outstanding — After eight months of continuous operation, without once removing the cutters from the machine, Aber "Curved Tooth" cutters produced 20,000 pieces against previous peak outputs ranging between 3,000 and 4,000. In addition the cutters are still producing pieces within specified tolerances and with a finish finer than that obtainable with NEW standard type cutters.



Here Are the Facts

OPERATION DATA

MACHINE: U. S. Multimiller

TOOL: Aber "Curved Tooth" right and left hand shear side milling cutter. 3"x⅝"x1¼"

MATERIAL: Bronze Turbine Blades.

COMPARATIVE PERFORMANCE

	ABER CUTTER	STANDARD CUTTERS
S.F.M. Speed:	400sfm	400sfm
Feed per Rev.:	16" per min.	12" per min.
Depth of Cut:	⅛"	⅛"
Pieces per Grind:	20,000 and still going strong	3,000 to 4,000 maximum



You too can profit by applying Aber "Curved Tooth" milling cutters for increased production and reduced rejections due to off-tolerance, unsatisfactory finish milling operations. Remember every Aber Tool has the exclusive, patented "Curved Tooth" design providing chatterless, smooth cutting action.

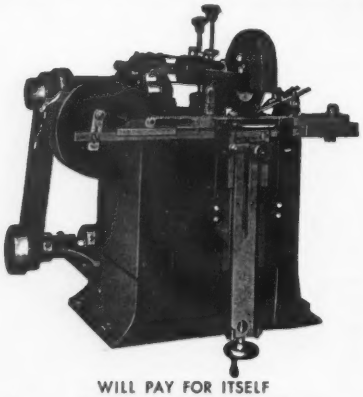
ABER

ENGINEERING WORKS INC.

WATERFORD, WISCONSIN

Company	Booth
O	
Oakite Products, Inc.	1715
Ohio Crankshaft Company	1377
Ohio Seamless Tube Company	1820
Ohio Steel Foundry	1958
Olsen Testing Machine Co., Tinius	1419
O'Neil-Irwin Mfg. Co.	630
Opplem Company, Inc.	115
Osborn Mfg. Co.	729
P	
Pangborn Corp.	901
Park Chemical Company	312
Parker Machine Company, Inc.	1732
Parker Rust Proof Company	1909
Partlow Corporation	1577
Penton Publishing Company	1733
Peters-Dalton, Inc.	1410
Phil. Bronze & Brass Co.	1587
Philadelphia Electric Co.	1483
Phillips Manufacturing Co., Inc.	635
Physicists Research Co.	1458
Picker X-Ray Corp.	441
Pittsburgh Tube Co.	240
Polyplastex International, Inc.	927
Porter McLeod Machine Tool	1271
Porter Precision Products Co.	1025
Precision Metalsmiths, Inc.	1461
Precision Products Co.	1125
Precision Shapes, Inc.	1015
Precision Welder & Flexopress Corporation	842
Product Engineering	1263
Production Machine Company	1540
Progressive Welder Sales Co.	928, 1105
Pyrometer Instrument Co., Inc.	1729
R	
Ransburg Electro-Coating Corp.	1983
Raytheon Manufacturing Co.	1815
Reeves Pulley Company	1553
Reinhold Publishing Corp.	1454
Rex Company, J. W.	1750
Reynolds Metals Company	1550
Richards Company, J. A.	1277
Riehle Testing Machines Div.	1239
Rochester Products Div.	1031
Rockwell Manufacturing Co.	1650
Rodgers Hydraulic, Inc.	1558
Rolle Manufacturing Co., Inc.	750
Rolock, Inc.	1810
Ryerson & Son, Inc., Joseph T.	318
S	
'S' Corrugated Quenched Gap Co.	1119
S & S Machinery Co.	1657
Sales Service Machine Tool Co.	1467
Sandvik Steel, Inc.	402
Scherr Co., Inc., George	1269
Schrader's Son Division, A.	1856
Schnell Tool & Die Corp.	1453
Sciaky Bros., Inc.	1719
Scientific Electric Div.	1227
Scott & Son, Inc., C. U.	1228

INSTEAD OF 2 SHARPENINGS . . . GET 5 or 6 PER BLADE



WILL PAY FOR ITSELF
IN A MATTER OF MONTHS

HACK, CIRCULAR, BAND SAWS

Instead of only 2 or 3 sharpenings per blade the EC Automatic Grinder sharpens hack saw blades 5 or 6 times before they require replacement. The EC is fully automatic grinding from 30 to 75 teeth per minute. This is the only grinder that does not depend on the shape of grinding wheel edge to shape the cutting edge of the tooth. Write for Bulletin EC Combination Hack, Circular and Band Saw Grinder . . . Wardwell Mfg. Company, 3166 Fulton Road, Cleveland 9, Ohio.

WARDWELL

Maker of largest line of saw and tool sharpening machines

PRECISION *begins on* HERMAN STONE



PINK GRANITE SURFACE PLATES

Precision — from start to finish — is the key to profitable mass production. In tool rooms, and on inspection and quality control operations, the absolute accuracy of Herman Stone granite surface plates insures permanent, profitable precision.

Take advantage of the much closer tolerances . . . the freedom from rust, warp and corrosion . . . the non-magnetic and temperature-resistant features . . . and the unmatched hardness of Herman Stone granite surface plates.

Cost? Herman Stone granite surface plates actually cost less today than in 1942 . . . most stock size plates are more economical than ordinary cast iron plates.

Delivery? Recent doubling of our specialized production facilities, devoted solely to the production of granite surface plates, T-bar plates and straight edges, assures prompt delivery — on many sizes, direct from stock.

FREE TRIAL IN YOUR PLANT

The Herman Stone Co.

THE FIRST STEP . . . to lower quality control costs!

Mr. R. A. Mayne, Sales Manager
The Herman Stone Co.
324 Harries Bldg.
Dayton 2, Ohio

Dear Mr. Mayne:

Tell me how I can trial-test a Herman Stone granite surface plate in our plant, without cost or obligation.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

Company	Booth
Scovill Manufacturing Co.	1685
Selas Corporation of America	1601, 1910
Sentry Company	1324
Sharon Steel Corp.	660
Sheldon Machine Co., Inc.	841
Shell Oil Company	1349
Smith Corp., A. O.	354
Smith Welding Equipment Corp.	1828
Snap-On Tools Corp.	1127
Socony-Vacuum Oil Co.	1876
Solventol Chemical Prod., Inc.	512
South Chester Corp.	1026
Sparkler Mfg. Co.	1875
Special Libraries Assn.	1020
Spencer Turbine Co.	1601, 1910
Sperry Products, Inc.	1754
Standard Alloy	1250
Standard Die Set Mfrs., Inc.	1640
Standard Electrical Tool Co.	908
Starrett Company, L. S.	1843
Steel City Testing Machines, Inc.	1416
Steel Founders' Society of America	101
Steel-Parts Mfg. Company	1382
Steels Engineering Products (Canada) Ltd.	1369
Sterling Electric Motors, Inc.	1949
Stevens, Inc., Frederic B.	244
Stimpson Company, Inc., Edwin B.	605
Stokes Machine Company, F. J.	1385
Stone Machinery Co., Inc.	551
Stuart Oil Co., Ltd., D. A.	1251
Sub Zero Products Mfg. Div.	1320
Sun Oil Company	1427
Superdraulic Corporation	1877
Super-Grip Anchor Bolt Co., Inc.	1481
Superior Tube Company	1630
Surface Combustion Corporation	231
Sutton Engineering Company	740
Swan-Finch Oil Corp.	1032
T	
Taco Heaters Incorporated	1829
Tempil Corporation	155
Texas Company	717
Thread-All Sales Co.	918
Tide Water Associated Oil Co.	1450
Tin Research Institute, Inc.	852
Tincher Products Company	1975
Tinnerman Products, Inc.	1330
Titanium Alloy Mfg. Div.	1316
Titanium Metals Corp. of America	120
Tocco Division	1377
Topper Equipment Company	1351
Torit Manufacturing Co.	1881
Turco Products, Inc.	1028
Tyler Manufacturing Co.	1280
U	
Uddelholm Company of America	915
Udylite Corporation	216
Union Carbide & Carbon Corp.	1202
Union Steel Products Company	1216
U. S. Electrical Motors, Inc.	760

IT'S HERE! A LOW PRICE *Automatic* COIL CRADLE

Medelton Motor Driven

"Poweroll"



$270.00
F.O.B. N.Y.
800 LBS. CAP.

$357.00
F.O.B. N.Y.
2000 LBS. CAP.

FEATURES . . .

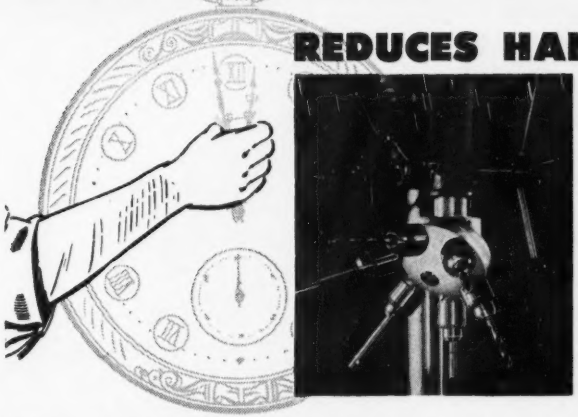
- Eliminates hazards of lifting heavy rolls.
- Roll on your coil and it's ready to go.
- Slack loop prevents drag on feed or dies.
- 30% to 40% higher daily production on hand or automatic feeds.
- Re-loading time kept to a minimum.
- No pulling of coils, avoids operator's fatigue, and results in faster feeding.

Write for circular. • Dealer inquiries invited.

WM. HALPERN & CO., INC.
Machine Tools
51 PARK PLACE, NEW YORK 7, N. Y.
245 CONNECTICUT AVE., BRIDGEPORT, CONN.

LIGN-O-MATIC

REDUCES HANDLING TIME



for all consecutive drilling operations

PROVEN PRODUCTION INCREASES with consistent precision . . . are obtained by adding a Lign-o-matic to any standard drilling machine. Turret indexes faster than tools can be changed or work moved to next spindle. Keeps your men drilling instead of moving work or changing tools. Frees machines for other work. And remember, this is the *only* drill turret with the patented, self-centering principle that guarantees sustained accuracy equal to the drilling machine itself.

VERSATILITY — Fits any standard drilling machine without altering the machine. Handles operations such as drilling, reaming, counterboring, and tapping (on reversible spindle machines) up to ½ inch diameter on any material. Mating tapers and self-centering bearings assure perfect alignment with drill press spindle while minimizing wear throughout long, hard use.

MONEY BACK GUARANTEE — Try it at our expense. If you are not completely satisfied for *any* reason, return turret within 10 days and pay nothing! Two-year guarantee against defective parts.

PRICE — Model D, 6 spindles with No. 2 Jacobs male taper . . . $235.00.

DELIVERY — Currently, 2 weeks.

☐ Please rush ..... Lign-o-matic turrets for (drill press make) .....

(size) ..... (quill dia.) ..... (spindle taper) .....

My name.....

Title.....

☐ Please send literature on Lign-o-matic turret. (Attach coupon to company letterhead)

HOWE & FANT, INC. 536 FLAXHILL ROAD SO. NORWALK, CONN.

Work EASIER — FASTER with Mall "Mighty Midget" PNEUMATIC DRILLS



Lighter — Smaller — More Powerful Than Any Similar Type Tools . . .

You can't beat the handling ease of a Mall "Midget" Pneumatic Drill . . . Weighs less than a pound in your hand —with lever or button throttle for added convenience. Attachments for wire brushing, grinding, rotary filing, sawing and sanding fit directly into chuck. Equipped with latest type "noise silencer" for quiet operation. Drill comes with Kett 3-Jaw chuck spanner and open-end wrench, lubricant, and ¼" x 8' air hose.



Model PD-103L
3/16" Pneumatic Drill
— Weight 14 Oz.

Model PD-204L
¼" Pneumatic Drill
—Weight 1⅜ Lbs.

Send for Descriptive Bulletins.

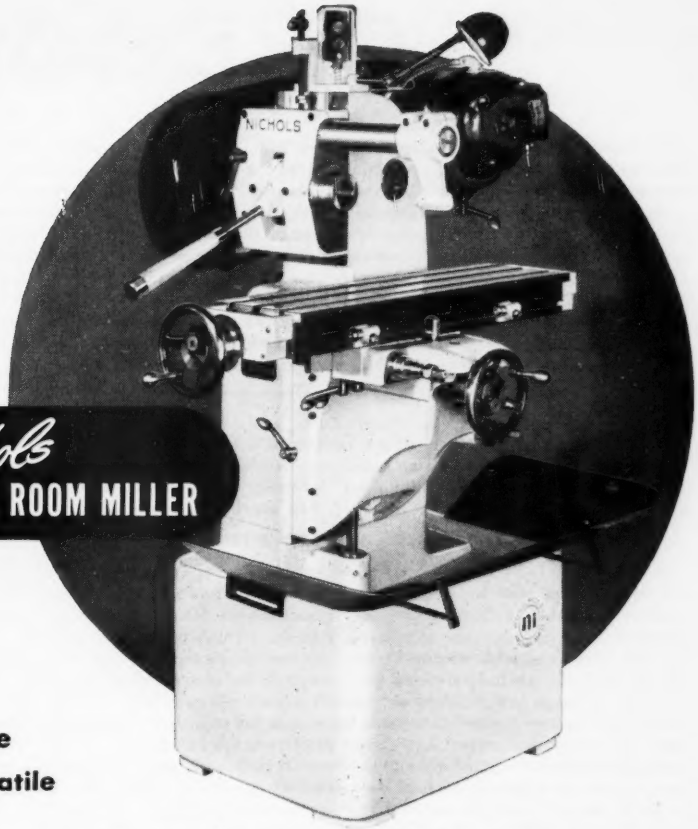
40 Factory-Owned Warehouses, Coast to Coast, To Serve Our Customers And Thousands of Dealers.

MALL TOOL COMPANY
7814 S. Chicago Avenue
Chicago 19, Illinois

Company	Booth
U. S. Pipe and Foundry Co.	702
U. S. Plywood Corporation	1282
Upton Electric Furnace Co.	1519
V	
Vanadium Corporation of America	618
Vapofier Corporation	1953
Versa-Mil Company	741
Viking Sales, Inc.	928
W	
Waldes Kohinoor, Inc.	1915
Walker-Turner Div.	1941
Wall Colmony	1131
Warner Division	610
Waukee Engineering Co.	1223
Webber Appliance Co., Inc.	1368
Welders Supply	1380
Weldwire Co.	1383
Westinghouse Electric Corp.	1510
Weston Electrical Instrument	1011
Wheelco Instruments Co.	641
Whitehead Metal Products Co.	1283
Wiegand Company, Edwin L.	1244
Williams, Brown & Earle, Inc.	1232
Wilson Mechanical Instrument Div.	706
Worthington Pump & Machinery	1720
Wells Mfg. Co.	1678
Z	
Ziess, Carl	920



"I hope you had a good day at the shop today, dear. You'll have to make your own supper; I've gone out to my sewing circle!"



Nichols
TOOL ROOM MILLER

Accurate
Sensitive
Versatile

A compact, rugged miller that gives the tool room what it demands – extreme accuracy and utmost flexibility. The NICHOLS TOOL ROOM MILLER is arranged for sensitive hand screw feed. It has generous table surface of 8½" x 30", with 19" longitudinal travel. Precision feed screws are fitted with oversize, easy-reading micrometer dials. Large hand wheels provide the element of "feel" so important in precision milling. Rise-and-fall spindle enables easy handling of many difficult operations – increases usefulness – simplifies set-ups. Readily available are dividing head, vertical attachments, vises, and a full line of milling accessories. Priced surprisingly low. Descriptive literature sent on request.



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NATIONAL DISTRIBUTORS

NICHOLS-MORRIS CORPORATION

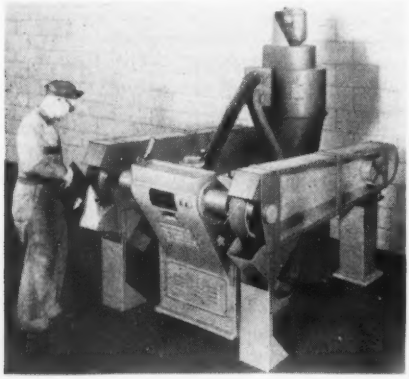
76-H Mamaroneck Ave., White Plains, N. Y.

On Exhibit at

In Booth No. 110, Handy & Harman, New York 38, N. Y., will have a live exhibit featuring Easy-Flo and Sil-Fos silver brazing alloys. A high production brazing job, which will be located in the center of the booth, will demonstrate how two pieces of metal can be rapidly and permanently joined with Easy-Flo silver brazing alloy. At another table at the left, torch brazing will be employed to show how versatile this metal joining method can be. The company's "Trimetal" will also be demonstrated as a joining medium for tipping tools with cemented carbides. Several moving picture shorts which give pertinent facts about silver alloy brazing and its uses on production work will be presented, and four typical case histories of recent brazing jobs will be shown on the right side of the background. The other side will be devoted to Handy & Harman brazing service, while the center of the booth will be decorated with a large seal telling of the company's 85th anniversary which is being celebrated this year.

The Alvey-Ferguson Co., Cincinnati, Ohio, will exhibit in Booth No. 530 its washing and processing machines for cleaning and processing metal parts and products. A washing machine will be equipped with glass vision panels and marine lighting so that the interior of the machine can be seen during washing operations. Personnel will be on hand to explain the applications of the company's equipment for cleaning and processing operations.

In Booth No. 1850, Nelson Stud Welding, Division of Gregory Industries, Inc., Lorain, Ohio, will feature four stud welding applications of importance to the shipbuilding industry and a recently perfected method, known as "Nelwelding," for aluminum stud welding in which a standard inert gas attachment is used with the lightweight portable Nelson gun. The exhibit will also show how stud welding is used for the installation of nailers required for the installation of cold storage compartments on shipboard; for plug-welding bulkheads to stiffeners; and for welding cargo batten hooks which are installed vertically with ¾-inch studs. Trailer-mounted Nelwelding power sources of several types will be employed for demonstrations on industrial and agricultural equipment. A wide range of templates and other special locating devices developed by Nelson engineers will be shown along with methods used for the installation of cover plates, and name plates, as well as an assortment of applications in which studs are used to hold, hang, or handle material through various processing sequences.



Hammond Machinery Builders, Inc., Kalamazoo, Mich., will have on display and in operation in Booth No. 1130 its line of polishing, buffing, and deburring machines, dust collectors, No-Dust grinders, abrasive belt grinder-polishers, and carbide tool grinders. The accompanying illustration shows an installation consisting of a Model VRO Variable Speed Polishing Lathe with two backstands and guards connected to a Hammond Cyclone Duskolector. This unit will be in operation at the show.

Two carbide tool grinders will also be shown in the exhibit, and company engineers will be on hand to demonstrate the equipment and discuss any grinding and finishing problems presented.

t the Metal Show

In Booth No. 448, Alloy Rods Co., York, Pa., will present the first showing of a 22-minute motion picture in full color and sound showing how arc welding electrodes are manufactured. Comprising about 45 scenes "shot" on Alloy's production lines, the picture proceeds from the initial step—the cold drawing of hot rolled rod—on through the many manufacturing, research, and quality control processes to the company's method of packing finished electrodes in sealed all-metal moistureproof containers. The viewer is taken via the camera right up beside production workers, laboratory technicians, and quality control specialists in a series of "close ups" which are explained by a narrator who interprets what is going on in easily understandable terms. After its premiere at the Metal Show, 16 millimeter prints of the entire movie will be available to any reputable organization or group desiring to show the film. Arrangement may be made by writing Department M, Alloy Rods Co., York, Pa. In addition to the film, the company has published a 24-page brochure showing the key "stills" of the picture for distribution to viewers and other interested parties.

In Booth No. 1540, Production Machine Co., Greenfield, Mass., will demonstrate three centerless-type grinding and finishing machines, including a new model of the Type 101 machine which is arranged for wet grinding on metal, fiber, rubber, plastics, and other similar materials. The company also plans to show a triangular-type idler backstand to be used with the machine, as well as a special work feeding fixture for handling bars and tubes. All machines are designed for use with abrasive or felt belts.

Superior Tube Co., Norristown, Pa., will feature new applications of titanium tubing and the important advances of metallurgical research on fine small tubing in Booth No. 1630. A separate panel of the booth will depict major applications of Superior tubing in such widely varied industries as chemical processing, aircraft Diesel engines, metalworking, medical and dental, measusing instruments, electronics, and automotive. Company experts will be on hand to explain and dramatize the uses of numberless analyses of special alloys in round and shaped tubing. Any individual problems related to precision tubing fabrication will also be discussed.



ON EXHIBIT AT THE METAL SHOW



In Booth No. 140, The Lincoln Electric Co., Cleveland, Ohio, will feature new industrial models of a.c. welding machines in 300, 400, and 500-ampere capacities. The new design (illustrated) replaces previous 300 and 500-ampere machines and incorporates new features, such as a large, easily-read, front-mounted amperage dial and a geared crank which is said to provide for the easy and smooth setting of amperage. An improved downdraft ventilation system which brings air in from the top of the case, circulates it by baffles through the windings, and prevents any air from being recirculated is also incorporated in the new design. All electrical and mechanical control parts required for connecting or that need maintenance are accessible without removing the case. Also to be exhibited as new equipment will be a hard-surfacing flux for hard surfacing with automatic hidden arc welding. With this flux, a standard mild steel electrode is used, the hard surfacing elements being contained in the flux and alloyed in the arc. The exhibit will show the adaptation of Manual Lincolnweld equipment for semi-automatic hidden arc welding to a gasoline engine-driven welder. This adaptation is a new addition to Lincoln's line of gasoline engine-driven welders and will be useful on outdoor work, such as pipeline welding. A new technique of automatic welding, known as the twin-arc process of hidden arc welding, will be demonstrated. This technique involves a unique and simple method of feeding two electrodes in tandem to deposit metal into a single crater.

Finished PIPE NOTCHING IN 5 SECONDS OR LESS

ARC-FIT actually notches out pipe or tube ends in less than 5 seconds to give you snug-fitting "T" or angle joints, ready for welding or brazing, without deformation or any extra finishing.

Standard ARC-FITS for "T" joints using single size standard pipe from ¾" to 2" shipped promptly from stock.

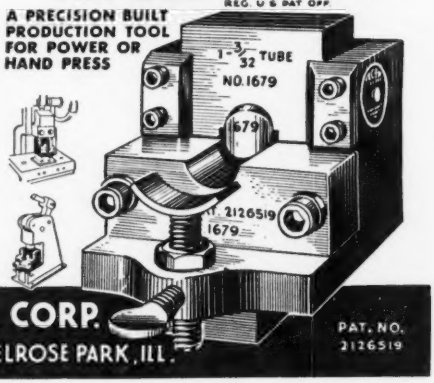
Special ARC-FITS for larger sizes or angular cuts supplied to your specifications . . . Quick-interchangeable punches and dies also available. Send us drawing of joint and material specifications for quotation and full information.

ARC-FIT IS PRICED SO THAT EVEN THE SMALLEST SHOP CAN AFFORD IT

Ask for descriptive Bulletin MMS.

with ARC-FIT
REG. U.S. PAT. OFF.

A PRECISION BUILT PRODUCTION TOOL FOR POWER OR HAND PRESS



Vogel TOOL & DIE CORP.
1823 N. 32nd. AVE., MELROSE PARK, ILL.
PAT. NO. 2126519

INCREASES PRODUCTION...

LOWERS COSTS...

PAYS FOR ITSELF QUICKLY...



The ROUSE HAND MILLER is a widely used, inexpensive, high speed, ball bearing, motor driven machine for handling light cuts in brass, aluminum, steel, plastics, and other materials—fast, accurately, and at very low cost. Only $106.00.*

Fixtures (illustrated) extra.

Motor equipment:—¼H.P. 110 Volt AC 60 cycle, single phase, swivel motor mount and light—$29.00.*

**All prices FOB Chicago.*

- ★ **MILLS SMALL PARTS MUCH FASTER.**
- ★ **DRASTICALLY CUTS YOUR INVESTMENT IN EQUIPMENT.** Replaces expensive production machinery—or releases it for other jobs.
- ★ **INEXPERIENCED HELP CAN OPERATE IT.** Safe, simple, fool-proof operation.
- ★ **NO MORE COSTLY SET-UP TIME. $106.00*** price so low that it pays to keep one or more Hand Millers always set-up for special operations.
- ★ **YOU GET A BETTER PRODUCT**—the result of ABSOLUTE ACCURACY.
- ★ **A LOSS BECOMES A PROFIT** when marginal pieces are finished on the Hand Miller instead of on high cost equipment.
- ★ **VERY LOW MAINTENANCE.**
- ★ **USED REGULARLY IN 1163 MANUFACTURING PLANTS** (some of which use as many as 30 machines)—yet on the market a scant few years.
- ★ **UNIQUE—VERSATILE.** Nothing else like it. One or several machines can be the answer to some of your production problems.

Write today for further information.

H. B. ROUSE & COMPANY
2214 N. WAYNE AVE., CHICAGO 14
50 YEARS OF SERVICE TO INDUSTRY

ON EXHIBIT AT THE METAL SHOW



In Booth Nos. 524 and 623, The DoAll Co., Des Plaines, Ill., will exhibit the "Micro-Step" gaging system which is an integrated and related series of gaging items that permit gage blocks to be used directly in everyday gaging operations. The system incorporates a series of unique gage block holders and end standards which can be used to construct innumerable gaging and layout setups to 72 inches long in steps of 0.000025 inch, as well as a "precalibrated" dial indicator used with the holders for the purpose of constructing precise indicating-type gages, such as shown in the accompanying illustration. Other components of the system include 5 and 10-inch sine plates and the book entitled "Height-Combination Tables — Heat Expansion Calculator" which lists directly the gage blocks used in forming 10,000 different dimensions, as well as the correction to be made when checking non-steel parts with the aid of gage blocks at temperatures above or below 68 degrees Fahrenheit.

Included in the display will be the company's complete line of integrated dimensional quality control gages and accessories. Two models of DoAll's newly designed surface grinders will also be on display. On the Model D8-1, a gear generator attachment which is said to make it possible to grind precision gears on a DoAll surface grinder, will be demonstrated. Another surface grinder, Model D6-1, will be equipped with the latest attachments, such as the "Cool Grinding" attachment wherein the coolant flows through the grinding wheel and out at point of cut as a fine mist; a magnetic chuck with "Selectron" chuck control; and a cylindrical grinding attachment. Various demonstrations will be conducted on this grinder, such as grinding directly to the feed wheel calibrations and taking very heavy cuts while maintaining fine-cut finish. The "Contour-matic" Band Machine will be used to demonstrate line grinding techniques on hardened metals and vitreous materials. High-speed friction sawing will be demonstrated on a 36W DoAll Zepher.

The exhibit will also contain activated displays on a complete line of cutting tools, band tools, and tool steel. A representative line of lathes will also be exhibited and demonstrated. Tool specialists and sales and engineering executives will be on hand to conduct demonstrations and answer questions concerning machine tools, gaging equipment, cutting tools, and industrial supplies.

WALTHAM SUB-PRESSES
. . . for precision work



Exact alignment and constant precision can be maintained throughout life of die. Made in 9 sizes. Babbitt bearing is tapered on outside and can be forced downwards. This reduces inside diameter to fit plunger when latter becomes worn through use.

Write for further information.

WALTHAM MACHINE WORKS

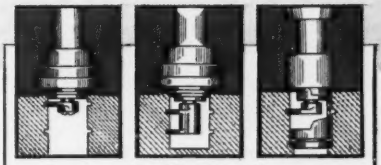


WALTHAM, MASS.

Waldes Truarc Internal Grooving Tool

for precision cutting of internal grooves
in bores and housings
FAST! ECONOMICAL! NEEDS NO SKILLED LABOR!





Groove located from top of hole | Double groove located from top of hole | Groove located from bottom of hole

Internal groove-cutting becomes the simplest of operations with Waldes Truarc Internal Grooving Tool. Easy to adjust—easy to operate...readily adaptable to individual requirements.

Designed for use in any hand drill or automatic drill press and screw machine... assures a concentric recess without injury to metal. Operates by fingertip pressure—especially suitable for unskilled operators.

The Waldes Truarc Grooving Tool when used in an electric or pneumatic hand drill, can be taken to the job eliminating disassembly and excessive handling...resulting in all-around savings in time and costs!

Write now for descriptive brochure giving mechanical details, cutting sizes...extra features



WALDES
TRUARC
GROOVING TOOL

WALDES KOHINOOR, INC., 47-16 Austel Place, Long Island City 1, N.Y.
Waldes Truarc Grooving Tool
Manufactured under U. S. Pat. 2,411,426

Waldes Kohinoor, Inc., 47-16 Austel Place Long Island City 1, New York
MM104
Please send me your descriptive brochure on Waldes Truarc Internal Grooving Tool.

Name_____

Title_____

Company_____

Business Address_____

City_____ **Zone**____ **State**_____

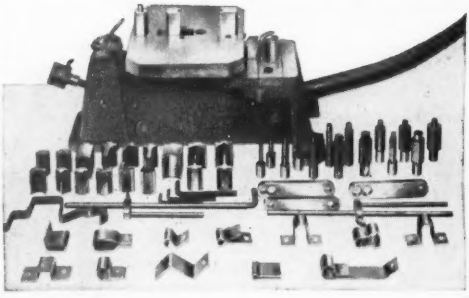
ON EXHIBIT AT THE METAL SHOW

In Booth No. 1843, The L. S. Starrett Co., Athol, Mass., will display its lines of precision tools, dial indicators, precision ground flat stock, steel tapes, hack saws, band saws, and band knives.

In Booth No. 1720, Worthington Corp., Harrison, N. J., will exhibit three welding positioners with rotations of ⅓, ¾, and 3 h.p., tilt motors of ⅓, ¾, and 5 h.p., and capacities of 500, 2500, and 6000 lb. A turning roll with a variable speed of from 4 to 64 inches per minute, a ½-h.p. motor, and rubber-tired rollers, as well as two idler rolls with a 4½-ton capacity, will also be exhibited. Members of the company's engineering and sales division will be on hand to explain its line of manual and motor-operated positioners which range in capacity from 100 lb. to 30 ton and its turning rolls which range from 3 to 200 tons in capacity.

A crush dressing unit designed for use on the "Diversimatic" centerless grinder will be demonstrated for the first time in Booth No. 1767 by Diversified Metal Products Co., Los Angeles, Calif. The unit incorporates a rigid cast-iron harp mounted on top of the main spindle housing. The harp supports a vertical, dovetailed column which is equipped with a sliding knee. The removable crush dressing roll and drive mechanism are mounted in the knee which may be lowered to contact the entire wheel face. The complete sliding assembly is counterbalanced and equipped with two manual controls—one for raising and lowering rapidly and the other for micrometer feed into the wheel. Where finish is important, the unit is said to permit complicated profiles to be rough turned on screw machines and centerless ground over their entire surface at high speed while maintaining unusually close tolerances.

A variety of metal-working production aids will be featured by E. F. Houghton & Co., Philadelphia, Pa., in Booth No. 724. A National nut taper, turning out threaded nuts at a rate of one every second with the aid of Antisep All-Purpose Base as the cutting coolant, will be in operation. A new liquid carburizer, designated as "Perliton 396," will be demonstrated with a complete operating salt bath exhibit, including quenching, cleaning in hot water, and rust prevention. The carburizer is soluble in water, making cleaning easy. Another feature of Houghton's exhibit will be an additive for water, designated as Houghto-Grind 50, used in grinding to prevent rust. A new "cold cleaner," consisting of a two-phase combination of Houghto-Clean No. 439 and Houghto-Clean No. 440 operated in power washers at room temperatures, will also be displayed. The cleaner leaves a very slight rust preventive film on the work; therefore, it has the dual advantage of not requiring heating facilities and leaves the work safe for subsequent operations without the danger of corrosion. Drawing compounds, heat-treating salts, and pickling inhibitors will also be included in the display.



Multiform

BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds Into Any Shape, Clamps, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, Steel Rule Dies, Etc.

AIR OR HAND MODELS FOR UP TO ¼" to 4" MATERIAL

Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.

Dept. 6 M **Kalamazoo, Mich.**

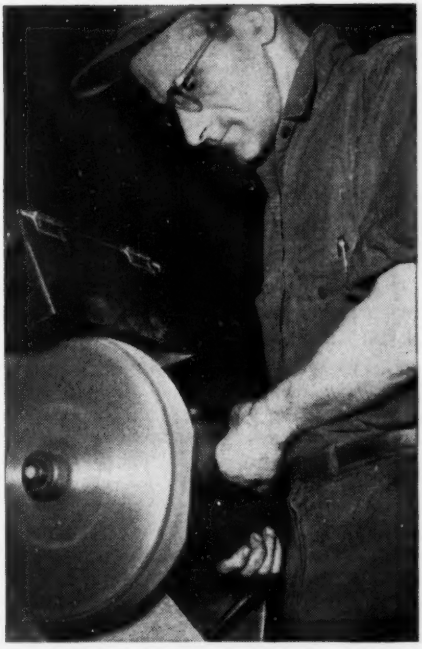
Armour Backstand Belts do the job right

Production Tripled!

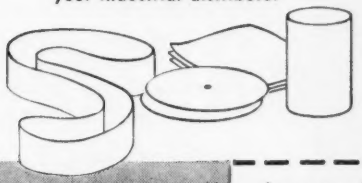
The Coan Mfg. Co. of Madison, Wisconsin, decided to use backstand belts instead of set-up wheels in sanding bevels on steel guides for vending machines. The switch *increased production from ten to thirty guides per hour!* These amazing results proved to them that Armour backstand belts are more efficient, more economical than set-up wheels.

Belts are only one of the many forms of coated abrasives available to you from Armour. There are more than 30,000 different varieties in grit size, backing, etc. We have sheets, rolls, discs, tubes—and specialty sizes to meet your specifications.

Let your industrial supply distributor tell you about this complete Armour line. Ask for your free copy of the booklet, "Facts about Backstand Belt Grinding and Polishing"— or send the coupon.



We recommend buying through your industrial distributor



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Coated Abrasives

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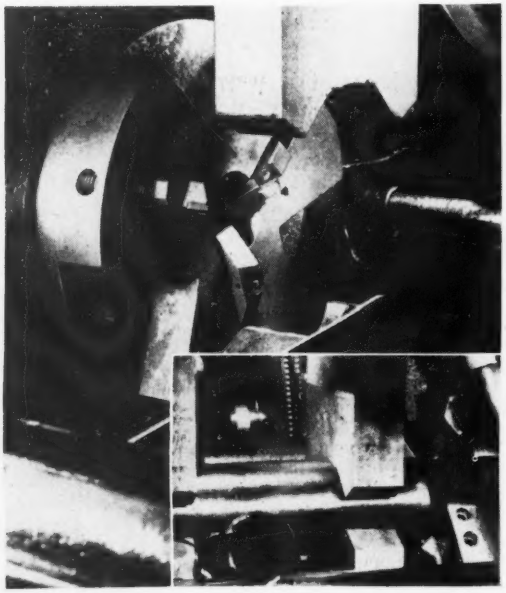
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modern equipment at work

Carbide Insert's Indexable Feature Affords Maximum Tool Life and Minimizes Down Time

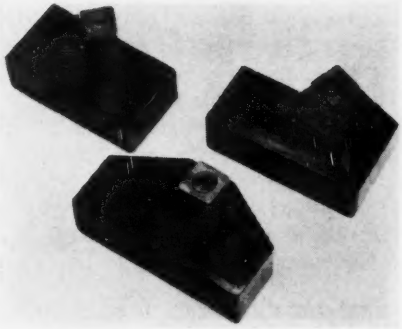
MAXIMUM tool life and minimum down time while simultaneously chamfering both inside and outside diameters and facing the ends of 3⅛-inch diameter steel cylinders of Shelby seamless tubing are effected by the use of standard Kendex square cemented tungsten carbide inserts on a Motch & Merryweather transfer machine. Located at Bendix Pacific Division's Plant No. 2, the machine utilizes two special facing heads each containing three ½-inch carbide inserts produced by Kennametal Inc., Latrobe, Pa.—two for chamfering and the other for facing the workpiece to desired length. The finished part is a tractor accessory actuating cylinder.

Details of operational sequence are as follows: Seamless stock is fed in, cut off by saw, and then transferred



Machining both ends simultaneously of 3⅛-inch diameter seamless steel cylinders on Motch & Merryweather transfer machine. Two special facing heads each having three ½-inch square Kendex inserts are used to chamfer i.d. and o.d. and face workpiece to length. By setting insert holder so that two cutting positions are obtained on each of the four indexable cutting edges, 150 to 160 pieces are machined per index or 1,200 to 1,280 pieces for the eight indexes. Inset at bottom shows overall view of operation.

to four clamping jaws. Next, each end is chamfered and faced to length simultaneously and then ejected. Each insert may be indexed four times. The width of cut on each of the inserts is less than ¼ inch. Chamfer insert holders are, therefore, positioned so that the actual cutting is performed toward the end of each cutting edge. After indexing each insert four times, outside and inside diameter inserts are interchanged to provide an additional four indexes per insert. The facing insert holder is simply moved in its slot to obtain two cutting positions on each of the four cutting edges, or a total of eight positions. Utilization of inserts in this manner enables 150 to 160 pieces to be machined per index—or 1,200 to 1,280 pieces for the eight indexes. The feed is 0.005 inch per revolution at a speed of 400 r.p.m. or 363 surface feet per minute.



Two chamfering tools and one facing tool utilizing ½-inch square Kendex inserts, Kennametal Grade K3H. Used in special facing heads for simultaneously machining both ends of 3⅛-inch diameter stainless steel cylinders on Motch & Merryweather transfer machine at 0.005-inch feed and 363 s.f.m.

After machining the above number of pieces, inserts are reground on top of the tip only, and indexing sequence is repeated. Two such regrinds are

STOP DUSTS *Instantly*

with

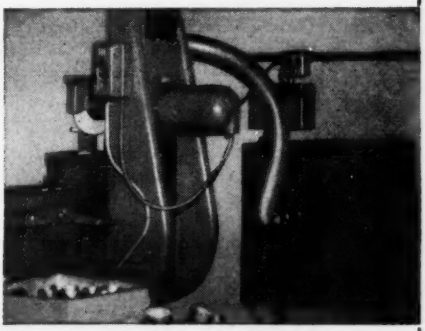
DUSTKOP

Available from stock of 22 standard models

300 cfm to 10,000 cfm

for: **Surface Grinders, Tool and Cutter Grinders; Polishers and Buffers; Abrasive Belts and Discs; Woodworking and Plastic Industry Equipment . . . DUSTKOPS collect almost all kinds of industrial dusts.**

Ask for Catalog 605-2. Describe dust problem for recommendation by return mail—no obligation.



AGET-DETROIT CO.

207 Main St. Ann Arbor, Mich.

available to provide a total of 3,600 to 3,840 pieces per set of six inserts. Changing time for the six Kendex inserts requires less than ten minutes. Thus, the indexable feature of the insert is fully utilized to provide maximum tool life with minimum of down time. A ten-to-one soluble oil is used as a coolant during sawing; however, the Kendex tips are used without any coolant.

Heat-Treated Rolls Engraved by New Tracer-Controlled Engraver

A TRACER-CONTROLLED pantograph engraving machine recently announced by the George Gorton Machine Co., 1706 Racine St., Racine, Wis., is now being successfully used in a steel mill for milling and engraving the surfaces of large rolls which have been heat treated to 50 Rockwell (C scale). Prior to the installation of this machine, such rolls had been marked in various ways, including stamping and hand chiseling. However, since the installation of the pantograph machine, which is capable of precision engraving the necessary symbols in the rolls, a substantial improvement in method and results has been effected.

The P-32 engraver illustrated is the smaller of two models available. Designed to accommodate rolls up to 36 inches in diameter x 7½ feet long, the machine is employed for

Important information for users of diamond lapping compounds and powders!





THE NAKED EYE CAN'T SEE THE DIFFERENCE

BUT ACTUAL MICROPHOTOS PROVE LABORATORY GRADED STAR-DUST SUPERIORITY AT A GLANCE!

We guarantee that accurately crushed and graded STAR-DUST is always uniform in nodular shape, permitting all particles to work. You'll never find "flats" or "off sizes" in STAR-DUST, which prevent accurate finishing.

STAR-DUST users report great savings in polishing time and labor. They produce mirror finishes in *minutes* instead of hours, on dies, tools, molds and parts.

Be "laps ahead" with STAR-DUST. Available in either dry powder form or premixed as a compound in opthalmic-tipped tubes, or in applicator gun that delivers minimum quantities and eliminates all waste. All grit and micron sizes. *Most sizes delivered from stock.*

We'll gladly give you an actual demonstration—or write us for interesting Brochure B-5.

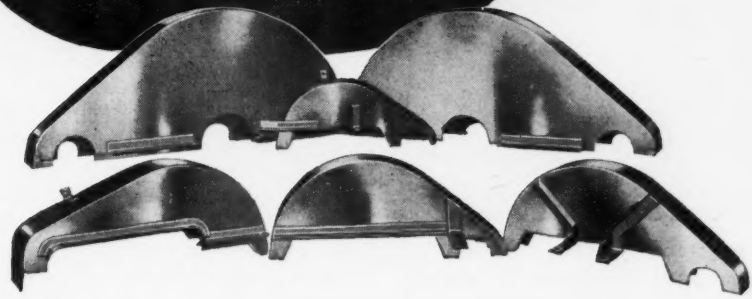
Star Dust

DIAMOND LAPPING COMPOUNDS AND DIAMOND POWDERS

ACE ABRASIVE LABORATORIES | 250 WEST 57th STREET NEW YORK 19, N. Y.

SHEET & PLATE FABRICATION by KIRK AND BLUM

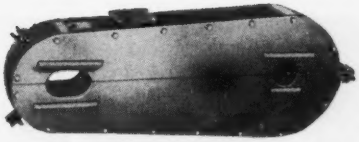
Belt and Gear Guards

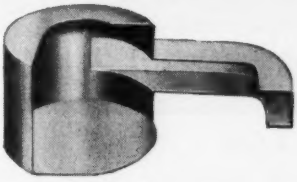


If you need welded steel belt or gear guards, bases, pans, pedestals, frames or other fabricated items for your production, call on Kirk & Blum. Complete facilities to ½" capacity for all types of fabrication.

Whether it's 1, 100 or 1000 units, Kirk & Blum can produce them promptly and economically.

Modern equipment, in a new, large plant, together with a skilled organization with 45 years' experience assures you of complete satisfaction. For a prompt quotation, send prints to **The Kirk & Blum Mfg. Co., 3203 Forrer Street, Cincinnati 9, Ohio.**

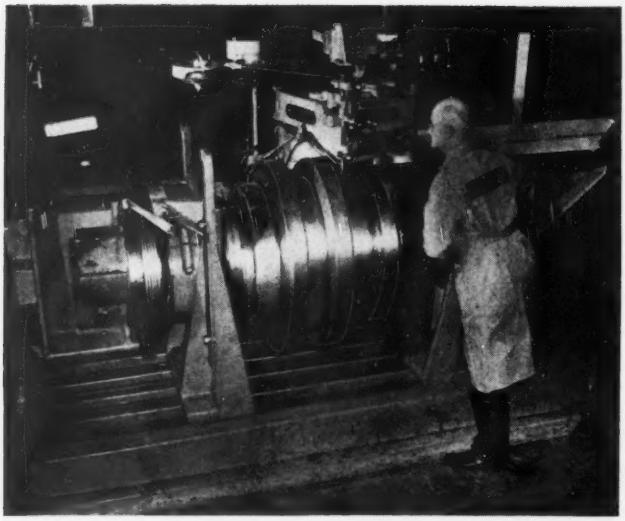




Drive Guards • Louvre Panels
Cover Plates • Drip Pans • Lathe Pans
Brackets and Supports • Tanks

KIRK AND BLUM

METAL FABRICATION



Tracer - controlled pantograph engraving machine used by steel mill to mill and engrave large heat-treated rolls

engraving letters and numerals on large rolls used in forming "I" beams, railroad rails, and reinforcing rods used in concrete work. The roll shaft is cradled at either end on two free-running rollers; an indexing ring attached to one end of the roll shaft is operated by a hand crank with worm and worm gear ring to turn the roll to any desired position.

The machine consists of a large strongly-ribbed bed casting which con-

Chicago MOUNTED Wheels



...now even better with

79E BOND

the new miracle grinding wheel bond

Greatest selection of sizes and shapes for every application. Best of all, deliveries are good . . . ready when you need them.

Try Chicago Mounted Wheels—bonded with 79E Bond—and you'll never buy any other! This tough new grinding wheel bond, exclusive with Chicago Wheel, has taken the industrial world virtually by storm, doing a better grinding job faster.

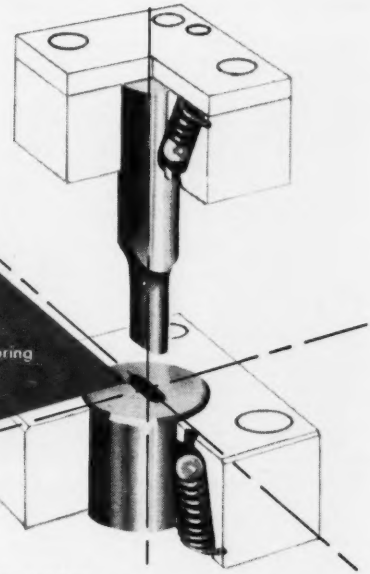
CHICAGO WHEEL & Mfg. Co.

Dept. MMS, 1101 West Monroe Street, Chicago 7

Positive Alignment

with Standardized
R-B PUNCHES AND DIE BUTTONS

The R-B ball lock prevents radial or vertical movement in the retainer once the punch or die button is locked in place. Just a push, a twist and "click" the ball locks in the recessed portion of the R-B standardized punch or die button—no additional keying required. Special shapes and the largest sizes of standardized R-B punches and die buttons are kept perfectly aligned, by the spring loaded ball lock. You can be sure of trouble-free piercing when using standardized R-B punches and die buttons.



TOOL STANDARDIZATION IS THE BASIS FOR SAVING PRODUCTION TIME. WITH R-B YOU GET THE ACCEPTED STANDARD OF THE SHEET METAL INDUSTRY — IN STANDARD DESIGN FEATURES THAT SAVE IN ENGINEERING, DIE CONSTRUCTION AND OPERATION.

● *SEND FOR 52 PAGE R-B CATALOG*

RICHARD BROTHERS DIVISION
ALLIED PRODUCTS CORPORATION

DEPT. 67 • 12625 BURT ROAD • DETROIT 23, MICHIGAN

Also Produced in Allied's Four Plants HARDENED AND PRECISION GROUND PARTS • STANDARD CAP SCREWS • SPECIAL COLD FORGED PARTS • SHEET METAL DIES • ALLITE DIES CAST OF ZINC ALLOY • JIGS • FIXTURES

tains an accurate keyway running the entire length of the bed in the center which is used to position the two work-holding brackets. On either side of this keyway is a T-slot for use in clamping the two U-shaped work-holding brackets, one at each end of the roll shaft. These brackets have 18-inch openings to accommodate roll shafts of varying diameters, and each upright has a vertical slot through which clamping bolts are inserted to position and clamp the two cross members which mount the roll shaft supporting rollers. A rugged elevating screw under each cross member is used to position the roll vertically and to provide positive support during use.

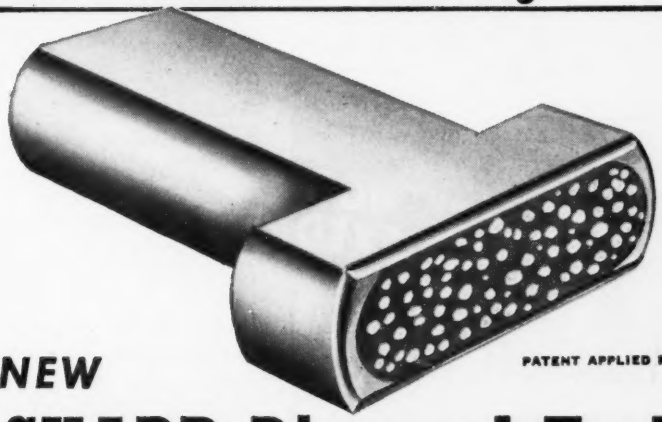
A heavily-ribbed solid rail with a scraped dovetail way on top is bolted to the rear edge of the base. A two-dimensional pantograph mechanism is attached to and slides along this dovetail way from one end to the other of the rail. This movement is effected by a large handwheel and a rack and pinion located under the rear edge of the rail. The pantograph is clamped in any position along the rail by means of a positive clamping lever. Transverse or cross movement of the pantograph to bring the cutter point over the axis of the roll is also effected on scraped dovetail ways. The saddle is then clamped in place by a clamping lever. When mounting or removing rolls, the pantograph is moved to the extreme right on the rail extension where it is out of the way.

One of the principal advantages



Cut Your Diamond Costs by 50%

—for Centerless Grinding

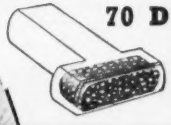


PATENT APPLIED FOR

with NEW

STA-SHARP Diamond Tools

The diamonds in STA-SHARP tools require no turning, no supervision, no inspection—which saves valuable operator and machine time. They are difficult to abuse—even through carelessness or incorrect use by inexperienced operators. STA-SHARP tools are not reset. They stay sharp to the very end. With the exclusive STA-SHARP design, as the top layer of diamonds wear down, the next overlapping layer comes into cutting position. That's why they dress wheels faster, make possible better finishes— produce more pieces between dressings—and save up to 50% on your diamond costs.



70 DIAMONDS PER SQUARE INCH

Phantom view shows overlapping layers of selected small SOLID diamonds which are firmly locked in place in a special matrix by exclusive bonding process. STA-SHARP tools are NOT cluster diamond tools. The cutting face of each STA-SHARP presents not less than 70 solid diamonds per square inch.



Send for Circular giving full details and prices on STA-SHARP Diamond Tools—also Catalog of complete line of Golconda Diamond Tools for every purpose.

Golconda Corporation

(DIVISION OF SUPER-CUT, INC.)

3418 North Knox Ave. • Chicago 41, Illinois

GOLCONDA CORPORATION • 3418 N. Knox Ave., Chicago

Gentlemen: Please send me special circular of STA-SHARP Diamond Tools and complete catalog of Golconda Diamond Tools.

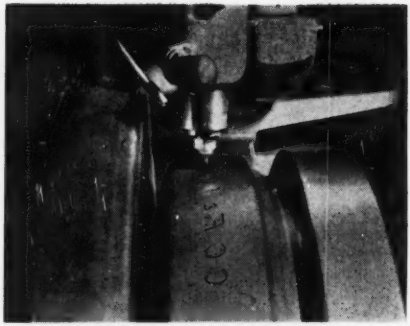
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Firm Name_____

of this roll engraver is that lettering, numbering, or other designs can be engraved on the curved surfaces of heat-treated rolls by using flat copy or master patterns. Another advantage is provided by the pantograph reduction ratio between tracing stylus and cutter. When an enlarged master is used and the pantograph ratio is set at 3 to 1 or 6 to 1, the amount of effort needed to trace the master is reduced by 3 in



Close-up view of heat-treated roll, showing engraving produced with tracer-controlled pantograph engraving machine

the first instance or by 6 in the second as compared with the amount of effort required at a 1 to 1 ratio.

A forming guide mounted above the cutter spindle and shaped to conform to the curvature of the roll is in direct contact with the former point at the top of the spindle during operation of the machine. As the cutter moves in a lateral plane, actuated by the tracer spindle and pantograph linkages, the forming guide forces the cutter spindle to follow the curvature of the roll in a vertical plane. A small hand crank is used to bring the forming guide down to its operating position. The forming guide holder slides in V-ways and has two micrometer stop screws for accurate positioning.



Now— "JOB-INDEXED" marking devices

Ever notice how difficult it is—in the average catalog—to find EXACTLY the right kind of hand or machine marking device?

New Method's *new catalog* classifies them by the jobs they do... in easy-to-find fashion.

Get your copy. Ask for Catalog No. NM-51.

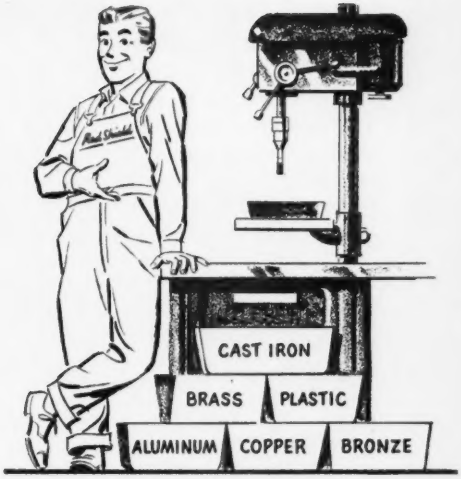
NEW METHOD STEEL STAMPS, Inc.
149 Joseph Campau. Detroit 7, U.S.A.

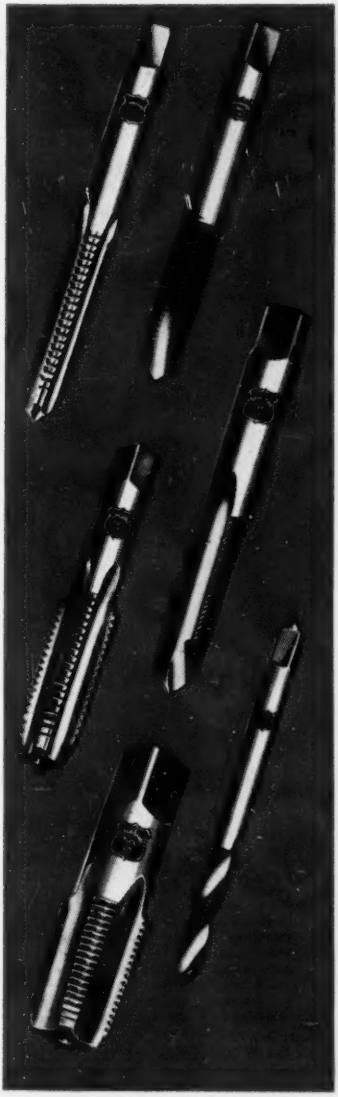


Specify DESTACO SHIM STOCK

Made from selected steel or brass, rolled to precision limits, oiled to resist stain and rust, free from burrs. Twelve assorted thicknesses .001" to .015", sheets 6" x 12", coils 120", identified every 6" by thickness and amount remaining on roll.

DESTACO DETROIT STAMPING COMPANY
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Special metals to tap? Red Shield makes it easy

TAPPING operations on materials such as aluminum, plastic, cast iron and non-ferrous metals are often unduly costly or slow.

To speed up and reduce the cost of such operations, specify and use Standard Red Shield Taps that are designed for use on these materials. Uninterrupted production and superior quality work results.

Standard service engineers are always glad to offer helpful suggestions on tapping problems. No cost or obligation. Reliable Mill Supply Distributors coast to coast provide efficient service on all Standard Red Shield metal cutting tools. It pays to Standardize.

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STANDARDIZE AND SAVE WITH STANDARD RED SHIELD METAL CUTTING TOOLS. THERE IS A STANDARD DISTRIBUTOR NEAR YOU AND READY TO SERVE YOU.



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You no longer have to guess whether you are overloading your live center thrust bearings if you use MOTOR TOOL LIVE CENTERS. When the load is too great the RED BAND around the spindle disappears into the housing. You can see at a glance when overloading occurs. This is an exclusive feature, developed by Motor Tool which cuts repair costs to practically nothing if due diligence is exercised. As long as the RED BAND is visible you are running COOL and SAFE.

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NEW descriptive folder . . . and *verified* case histories of how MOTOR TOOL LIVE CENTERS have *out-performed* and *outlasted* ALL other centers on exceedingly tough, continuous-run jobs.

MOTOR TOOL MFG. CO.

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Long Taper Bores Produced Economically

PRODUCING a long taper bore on piece parts is usually a difficult and expensive machining process, requiring several passes. Any slight error results in a poor fit with bushings on other mating parts.

Henry & Wright, large dieing machine manufacturer, meets this problem by using a specially designed multiple cutter roughing bar, as shown in the upper view in Fig. 1, and a floating taper cutter held in a special bar, as shown in the upper view in Fig. 2. Both tools were designed and manufactured by the Madison Mfg. Co., Muskegon, Mich. These tools eliminate the indi-

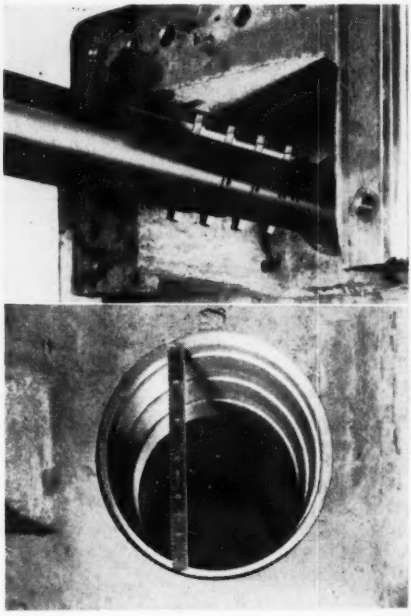


Fig. 1—(Above) Special multiple cutter roughing bar for step-boring casting shown in lower view

Cri-Dan "D" makes threading

STAINLESS - PAINLESS



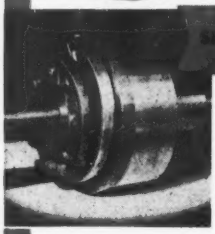
The fabulous Cri-Dan does it again! This Stainless Steel Anchor Nut requires a 63 micro inch finish, possible *only* on the Cri-Dan with its high speed and its use of a Single Point Carbide Tool. The resulting production is *five* times that of a lathe with a chasing operation.

If you want peak production and painless precision on "impossible" threading jobs call on Lees-Bradner and Cri-Dan "D".

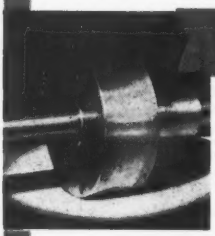
the LEES-BRADNER Company

CLEVELAND 11, OHIO, U.S.A.

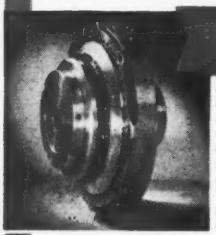
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Hilliard Over-Running Clutches and Couplings are automatic in operation. They are unsurpassed for automatic two-speed drives, dual drives, stand-by drives and for allowing machinery to "coast" after drive stops. Excellent as fixed or infinitely adjustable ratchets.



A reliable series of spring-loaded slip clutches and couplings. Rugged construction with ample friction surface for heavy-duty use. Outstanding for preventing overloads and shocks, for starting heavy loads, as tension drag brakes, for reeling and winding operations and many other uses.

★ HILLIARD CLUTCHES and COUPLINGS make machine drive and power transmission more efficient and economical. Experienced engineers will be glad to offer their advice on any problems. Complete descriptive material will be furnished on request.

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vidual turning and hand fitting of every bushing necessary with the cam type boring bar previously used. They also reduce the number of passes to two.

In operation, the work remains stationary while the bars revolve. The multiple cutter roughing bar step-bores the casting as shown in the lower view in Fig. 1. For the second pass, the floating taper cutter in a special bar finish

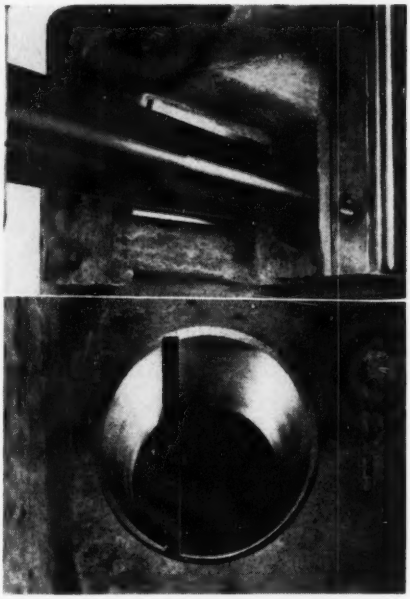


Fig. 2—(Above) Floating taper cuttter held in special bar for finish reaming stepped bore of casting to size as illustrated in lower view

reams the stepped bore to size, as illustrated in the lower view in Fig. 2. The floating action of the cutter produces the accurately sized and tapered hole required, while the two-blade principle ensures a good finish and eliminates the possibility of chip scoring the surface.

By changing over from a cam type



YOU CAN DO ALL OF THESE JOBS!

It's amazing how *versatile* Smith Welding Equipment is. That's because Smith's ingenious design permits quick attachment of accessories for special purpose work. All accessories fit one torch body. Insert one tip—and weld. Insert Cutting Assembly—and do cutting.

No wrench necessary—fingers do the job. For Smith's Lifelong Heavy Duty Torch Body, there are 10 different accessories for as wide a variety of work as a normal shop would ever be called upon to produce. Other Smith torches have similar versatility. Tips can be changed in 6 seconds. Standardize on Smith for efficiency. Write for information.

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Smith Welding Equipment Corporation
2633 S. E. 4TH, MINNEAPOLIS, MINN. - - - - - - - DEPT. MMS-51

bar to the Madison tools, the manufacturer saves 18½ hours of combined machining and hand fitting time on each dieing machine frame, eliminating the time previously spent in individual hand fitting of the tapered bushings.

Sixteen Pounds Saves Sixty Tons

WHEN a fracture occurred in the frame of a 60-ton press, this machine tool was reduced to a mass of useless metal. A production bottleneck arose which threatened a complete stoppage unless a replacement could be obtained or a repair effected. A welding repair was the only solution since replacement would take months. Speed was vital and strength an essential factor.



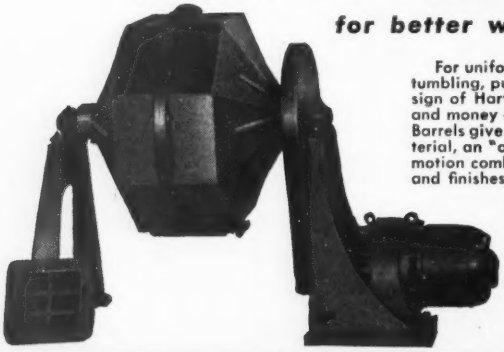
Close-up view of 60-ton press frame showing how fracture therein was quickly repaired with special chamfering tool and electrode with high affinity for cast iron, eliminating necessity of press replacement with consequent stoppage of production

Accordingly, welding methods were adopted which would provide maxi-

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CUTTING *and* TUMBLING BARRELS

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For uniform cutting down, wet or dry grinding, tumbling, pulverizing and mixing, the unique design of Hartford Triple Action Barrels saves time and money and produces better results. Hartford Barrels give a TRIPLE ACTION in tumbling the material, an "over and over, end to end, folding-in" motion combined, which quickly grinds off burrs, and finishes and smooths the general surface of any article in the load. These barrels are available in two sizes, large and small, and with both motor and belt drive. Hartford also makes steel burnishing balls scientifically correct in design and material for each specific job. Bulletin on request.

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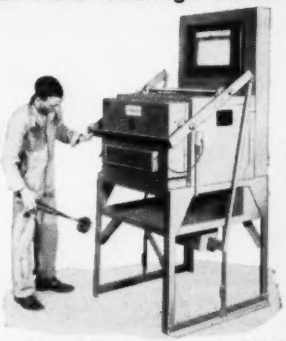
ZH552

Cooley ELECTRIC HEAT TREATING FURNACES

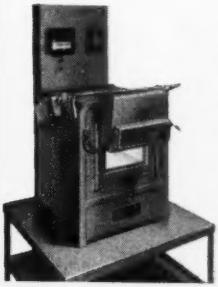
27 MODELS — *A Complete Source of Small Heat Treating Furnaces*

Indicating controlling Pyrometers are available with all Cooley Furnaces.

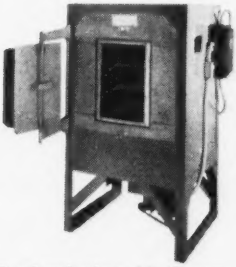
A special Cooley feature is a package unit comprised of furnace and integrally wired control panel, incorporating pyrometer, line switch and fuses—all completely factory wired.

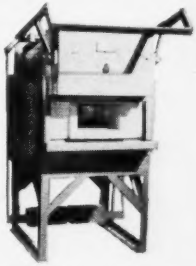


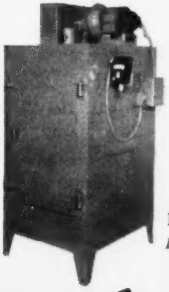
Bench Type — *For tools and small parts — to 2000°F* 12 models and sizes to 10" w x 8" h x 18" d.



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Recirculating Air Draw — *Box type for controlled heating to 1250°F* — steel tempering, glass annealing, etc. 2 models — sizes to 15"w x 24"d x 18"h.

High Temperature Box Furnace — *For high speed steel treating to 2500°F* — 3 models and sizes to 12"w x 8"h x 24"d.

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Cooley ELECTRIC MFG. CORP.
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mum speed combined with strength. The crack was veed with an oxygenless chamfering tool, trade named ChamferTrode and designed for use with a standard d.c. machine of 300-ampere or more capacity and an ordinary holder. An arc was struck and the ChamferTrode positioned. The concentration of energy literally blasted away the unwanted metal in a few seconds, leaving a clean bright groove which was found to provide an ideal base for welding.

EutecTrode 27 was chosen for the weld because of its high affinity for cast iron. This important characteristic facilitated the bond at the interface and ensured ease of application. Stringer beads were deposited with a short arc directed upon the deposited metal at all times. The technique of skip welding was used to prevent a local build-up of heat, and at no time was the base metal permitted to show heat-color. Light peening after each pass reduced the danger of residual stresses, and careful heat control throughout minimized contractual stresses.

The repair was completed in 4 hours; a replacement would have taken 8 months—twice as many months as the repair took hours. Overtime took care of the bottleneck build-up and production was unimpaired. One pound of ChamferTrode was used and 15 pounds of EutecTrode 27 in performing the repair job.

CUTS



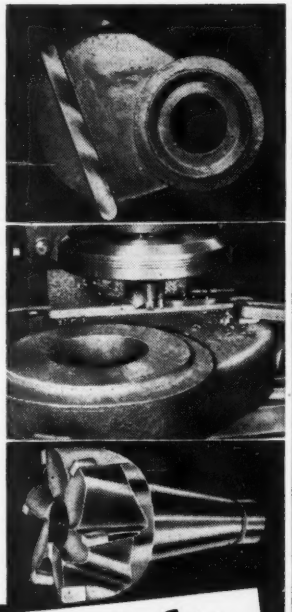
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The material – the toughest armor plate casting yet devised for military purposes! An impossible operation with other types of cutters tested.

SOLUTION: STOCK REMOVAL ⅜" to ½" IN 3 CUTS –
Finished surface parallel within .002 – NO REJECTS! A smooth machine like finish at 10½" per minute.

HERE'S THE NELCO TOOL THAT SOLVED THIS VITAL DEFENSE BOTTLE NECK!
The *rugged* virtually *indestructible* NELCO Taper Shank End Mill – A 4" carbide tipped cutter that literally chews away half an inch of the toughest alloy Armor Plate America has produced – leaving a smooth, accurate machine-like finish.

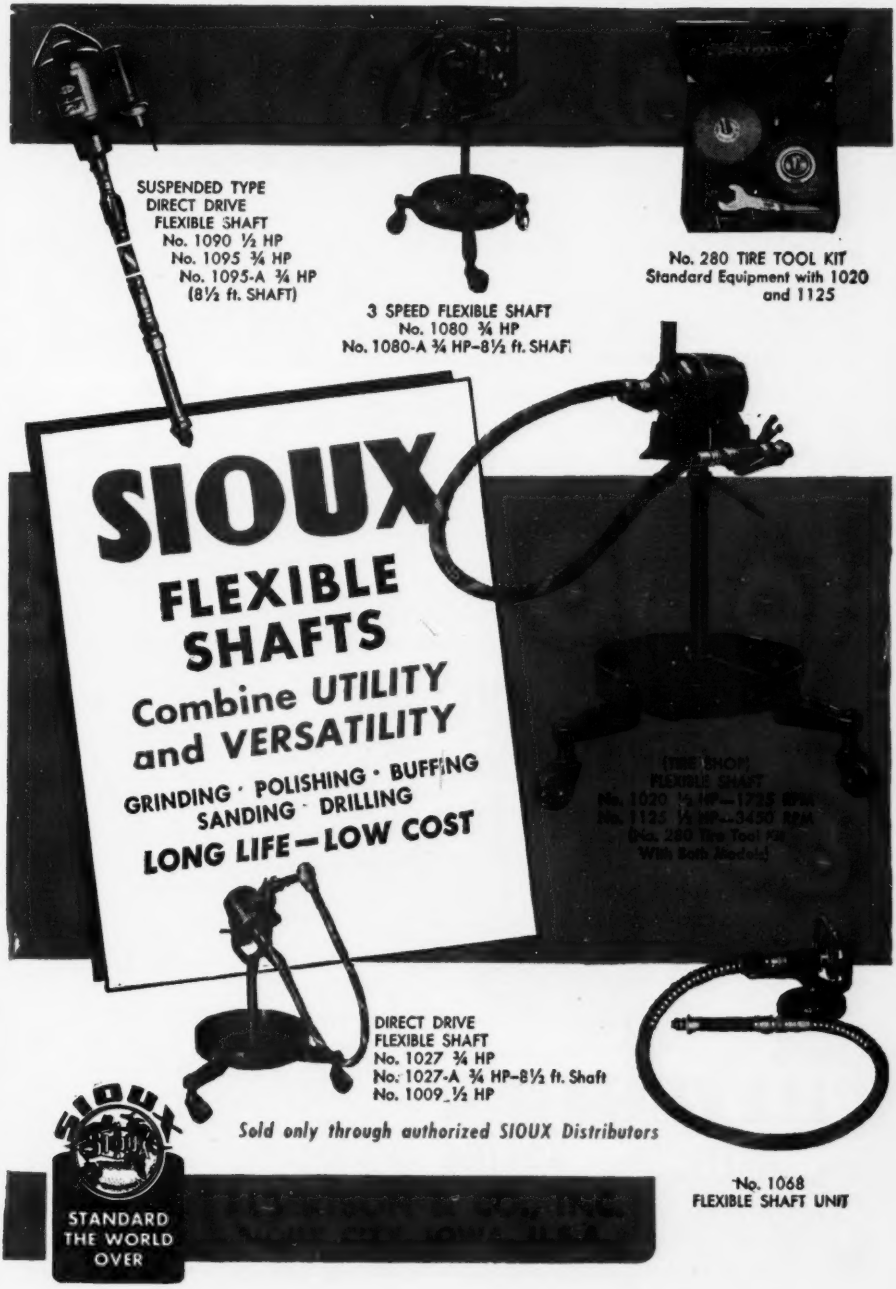
Write for catalog and complete details on this husky NELCO TAPER SHANK END MILL and the hundreds of other NELCO Engineered Carbide Tools – TODAY!



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For that Extra Edge in Production

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SUSPENDED TYPE
DIRECT DRIVE
FLEXIBLE SHAFT
No. 1090 ½ HP
No. 1095 ¾ HP
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(8½ ft. SHAFT)
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Standard Equipment with 1020
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STANDARD
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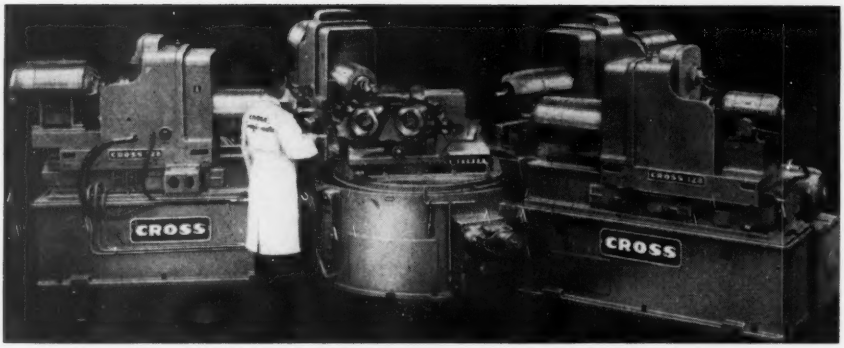


Illustration showing tank suspension support housings being produced on a special machine tool supplied by The Cross Co., Detroit, Michigan

Machining Tank Suspension Support Housings

SIX tank suspension support housings made of cast armor material having a Rockwell hardness of C42 are finished every hour on the special machine tool illustrated herewith, which was recently delivered by The Cross Co., Detroit 7, Mich. The operations performed by the machine include rough and semi-finish boring a multi-diameter hole and machining two snap ring grooves. After one bore of

for greater RIGIDITY more ACCURATE cuts



use CRITERION BORING HEADS

A full line of adjustable boring heads and bars now available. Heads 1½" to 7" dia. Carbide or high speed bars ⅜" to 1¼" dia. Lead screws ground AFTER HARDENING. Ample bearing surface, heat treated parts, interchangeable shanks. Criterion tools are the criterion. Write for free catalog and costs.

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Mac-it Hollow Lock Screws—positive locking that stays locked, can be adjusted repeatedly with no loss of efficiency.

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Socket Head Cap Screws
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Marketed Nationally Since 1913 by

STRONG, CARLISLE & HAMMOND COMPANY
Cleveland 13, Ohio

Manufactured by MAC-IT PARTS COMPANY, Lancaster, Pa.

the part is completed, the fixture is indexed and the operation is repeated for a second bore.

The machine has a fluid motor-operated index table with five stations. One station is for loading, three stations for boring, and one station for grooving. A 40 h.p. motor is provided for each boring spindle. Hydraulic and electrical construction is to J.I.C. standards. Other features of the machine include hardened and ground ways; hydraulic feed and rapid traverse; preset tools; and automatic gravity-operated cam clamping for the index table.



Chemical Plant Effects $16,000 Saving in One Year by Metallizing Engine Cylinders

A LARGE Mid-West chemical plant has 14 gas engines in compressor service, operating 24 hours a day. Most of these engines are 300 h.p. 8-cylinder 11½-inch bore 28-inch stroke units utilizing for fuel a mixture of hydrogen, methane, and air with charcoal dust added to increase combustion efficiency. In addition to the eight cylinders driving the engines, each engine has four horizontal combustion cylinders which are hooked into the same crankshaft, compressing from 0 to 650 p.s.i. After nine years of continuous use with shutdowns for inspection and overhaul not more than once every 18 to 24 months, the engines began to show signs of



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Gas engine cylinder being metallized while rotating in improvised jig setup. Mid-West chemical plant saved over $16,000 in one year on this type of metallizing job.

wear in the top third of the combustion cylinders, caused by heat and the abrasive in the fuel.

Three methods of reconditioning these engines were available: (1) the cylinders could be replaced and standard sizes of other components preserved at a cost of $450 per cylinder; (2) the cylinders could be rebored and fitted with oversized pistons and rings at a cost of $400 per cylinder; and (3) the cylinders could be restored to maximum efficiency by metallizing at a cost of $150 per cylinder, even allowing for the purchase of a horizontal boring mill and a vertical honing ma-

LAST WORD
WHEEL DRESSERS
Simplify the Job!

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ANGLE TANGENT TO RADIUS
WHEEL DRESSING

- Dresses grinding wheel at point of contact.
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Also Distributors of
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Blanchard Grinders, *with proper grinding wheels, can* and *do* give high production with extremely close tolerances for dimension and flatness. However, a No. 11 Blanchard user recently received erroneous advice on abrasive wheels from an outside source. The result was that 35 high-speed cam plates were ground on both sides in 1¾ hours with surface finish of 24 micro-inches.

By referring the problem to Blanchard, it was easily demonstrated that the No. 11, with correct grinding wheel, would give desired results—90 to 100 cam plates per hour, with surface finish of 4 micro-inches, dimension tolerance of ±.0002, and flat within 2 light bands.

Blanchard wheels are best for Blanchard Grinders — let Blanchard give you the benefit of their vast experience so that you too can get the most from your Blanchard machines.



Information on correct surface grinding procedure and wheel selection are given in "Work Done on the Blanchard" and "The Art of Surface Grinding." Write for free copies today!



PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

chine, plus a shop-made rig for preheating the cylinders before and during spraying with materials and equipment supplied by Metallizing Engineering Co., Inc., 38-17 30th St., Long Island City 1, New York.

Using the last method, the cylinders are bored, threaded, grit-blasted, degreased, and sprayed with a high chrome stainless steel, 20 to 30 lb. of of the steel being applied, depending upon the condition of the cylinder. The cylinders are then finish machined and honed to size. The company points out that whereas it had been customary on comparable jobs to allow a 0.010-inch closer fit than the desired finish size to allow for break-ins, this allowance is unnecessary with the metallized stainless steel.

During the first year, 64 cylinders were resurfaced in the plant at a total saving of about $16,000 over the unsatisfactory method of reboring and fitting the cylinders with oversized rings and pistons. A total of $19,200 was saved over the cost of new cylinders. Past experience with the unusual particle hardness of sprayed metal, its desirable lubrication characteristics, and the longer life of the stainless steel surface over the original cast cylinders has led company officials to estimate that the rebuilt cylinders are good for another 15 years of operation—over 60 per cent more than the original life of the cylinders before reconditioning.

SAVE 3 WAYS WITH



1 SAVE with a Lucifer Electric Furnace on FIRST COST. Our straight line production permits economical selling price, despite use of highest quality materials throughout. Check costs on other furnaces . . . feature by feature . . . you'll save money on the Lucifer Electric Furnace EVERY TIME.

2 SAVE ON MAN HOURS with a Lucifer Electric Furnace. Less operator attention needed because Lucifer controls are EXACT. They reach SPECIFIED heat rapidly and retain SPECIFIED temperature without variation. No special experience required when you use a Lucifer.

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Furnace Size	2000°	2300°
6x 6x12"	$467.00	$548.00
9x 9x18"	647.50	764.00
12x12x24"	912.00	1068.90
18x18x36"	1419.75	1629.50

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WRITE for FREE literature, specifications and price list of Lucifer Furnaces in wide range of sizes—top loading and side loading types. Engineering service and advice without obligation.

Write, wire or telephone TODAY.

GILBERT S. SIMONSKI COMPANY

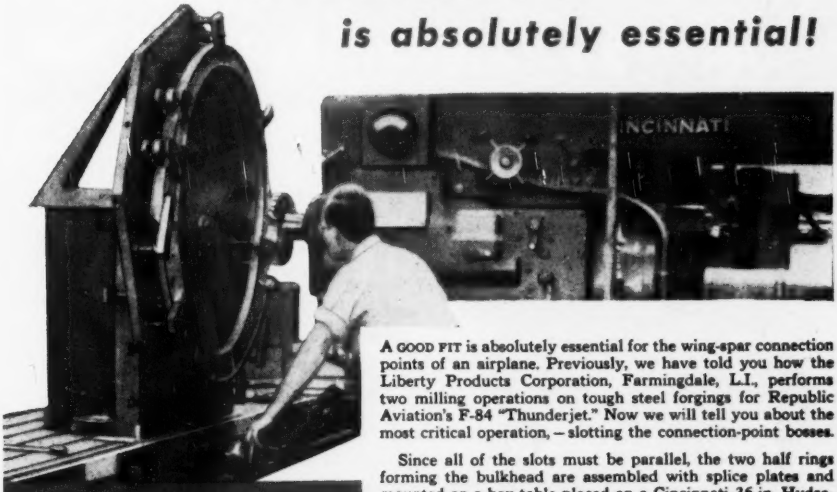
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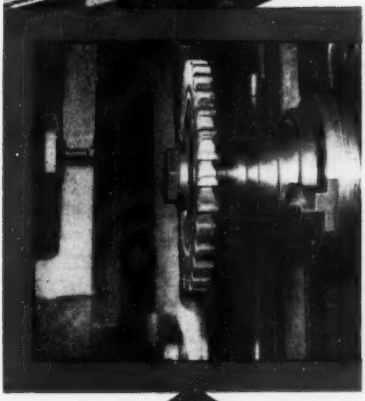
Sole Manufacturers of Lucifer Electric Furnaces

OK Carbide Cutters mill vital "Thunderjet" forgings – III

A GOOD FIT

is absolutely essential!





A GOOD FIT is absolutely essential for the wing-spar connection points of an airplane. Previously, we have told you how the Liberty Products Corporation, Farmingdale, L.I., performs two milling operations on tough steel forgings for Republic Aviation's F-84 "Thunderjet." Now we will tell you about the most critical operation, – slotting the connection-point bosses.

Since all of the slots must be parallel, the two half rings forming the bulkhead are assembled with splice plates and mounted on a box table placed on a Cincinnati 36-in. Hydro-Tel milling machine. The 8 slots in an assembled ring are milled with an OK 12-in biaxial slotting cutter to these tolerances: width, plus 0.002 in., minus nothing; depth, plus 0.010 in., minus nothing. One assembly is slotted per hour, and three pieces are produced per cutter grind. Spindle speed is 35 rpm and the feed rate is 2.5 in. per min.

It is not a happenstance that OK cutters are used for all three operations on this critical aircraft bulkhead. Liberty Products Corp. has standardized on OK cutters and uses them for a multitude of operations on more than 50 milling machines.

The inserted-blade principle developed and perfected by the OK Tool Company produces economical milling in plants making all kinds of products – airplane components, machine tools, printing presses and run-of-the-mine articles in all materials. Good performance starts with a heat-treated alloy steel body that easily absorbs the stresses of modern milling on high-powered machines. Blade slots are accurately located and machined, so that the tool is always in "geometric balance." Hence, each of the inserted blades is presented to the work at precisely the proper angle and all blades take chips of equal thickness. And because the wedge-shaped blades require no locking devices, they cannot come loose to spoil cutter work, but they are easily removed for replacement.

OK cutters are made in a complete range of sizes and styles. Blades are offered in high-speed steel, cast-alloy or cemented carbide. Cutter bodies are available with slots to position blades for positive or negative rakes, straight or shear cuts. And blades are interchangeable for several sizes of a specific style of cutter.

Further reasons on why it pays to standardize on OK cutters are found in Catalog 13. Write for your copy.

OK

modern milling cutters for modern milling machines

THE OK TOOL COMPANY, MILFORD, New Hampshire

Production Rhythm for the Grinding Department



SIMONDS ABRASIVE CO.

Grinding Wheels



Keep your production line humming. Get in tune for maximum output with Simonds Abrasive Co. grinding wheels.

You will find plenty of satisfaction, savings and serviceability in these accurately specified production tools. Right now they're proving their adaptability, efficiency and economy in every phase of industrial grinding from production snagging to micro-inch finishing. Complete line includes grinding wheels, mounted wheels and points, segments and abrasive grain.

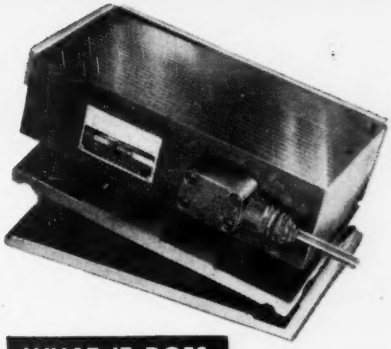
Write for free data book and name of your Simonds distributor.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

NOW... FASTER SET-UPS... GREATER ACCURACY IN ANGULAR GRINDING...

Magna-Lock SINE

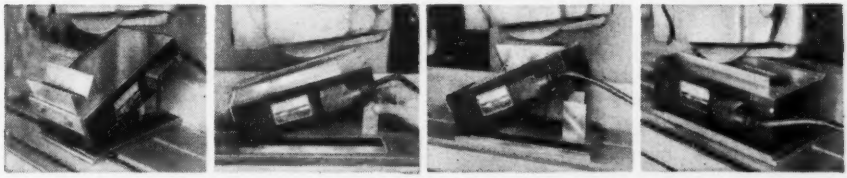


WHAT IT IS:

Magna-Lock Sine is a specially designed electro-magnetic chuck for making precision angular set-ups on surface grinders. Standard gauge blocks insure accuracy that's impractical to attain by other means. No dials, no scales... the only moving part is a simple, rugged, precision-made hinge.

WHAT IT DOES:

Whether a set-up requires single or compound angles, with Magna-Lock Sine they can be made in minutes, saving hours of set-up and machine-time. Magna-Lock Sine's powerful magnetic attraction holds work securely, minimizes distortion or warpage during the machining operation.



Send *now* for full details on Magna-Lock Sine, developed by MAGNA-LOCK ... *first* to increase your machine's productivity. Write Dept. MM-102

Magna-Lock

MAGNA-LOCK, INCORPORATED

Magnetic Chucks and Devices

BIG RAPIDS, MICHIGAN, U. S. A.

news of the industry

Borg-Warner Acquires E. C. Atkins & Company

Borg-Warner Corporation, Chicago, has announced the acquisition of E. C. Atkins & Company, Indianapolis, century-old saw manufacturing concern. The company will be operated under the name of Atkins Division of Borg-Warner. A branch factory of Atkins in Portland, Oregon, is included in the transfer of ownership and will also be operated as a unit of the Atkins Division.

In the company's new and thoroughly modern plant, straight-line production methods are employed in the making of saws ranging in size from ⅛-inch wide to blade-type saws 18 inches wide and 60 feet long. The company's line includes hand saws, crosscut saws, circular saws, band saws, and hack saw blades for cutting metals, plastics, wood, paper, and various other materials. Borg-Warner manufactures a wide variety of products, mainly highly-engineered and precision-made items for the automotive, farm equipment, aviation, and home appliance industries.

Twentieth Century Moves into New Plant

Twentieth Century Manufacturing Company has moved into a new, modern plant located at Route 176 and Bradley Rd., Libertyville, Ill. The plant includes the latest equipment for the high speed, precision production of Supeream decimal reamers, counterbores, stop reamers, Uneeda Light and Garberding stop pins.



New plant of Twentieth Century Mfg. Co., Libertyville, Illinois

H. E. Sloan Elected Cushman Board Chairman

At a meeting of the board of directors of the Cushman Chuck Co., Hartford, Conn., Harry E. Sloan, president of the company since 1928, was elected chairman of the board. Completing 53 consecutive years of service this fall, Mr. Sloan became vice president in 1919. He has been a director of the company since 1914 and served also as treasurer subsequent to 1939. Mr. Sloan is the son of Adrian Porter Sloan, one of the original incorporators of Cushman.

Harry E. Sloan, Jr., who has served under his father as vice president and secretary since 1939, has been elected president of the company. A director since 1938, Mr. Sloan, Jr., started with Cushman Chuck Company in 1937. He was graduated from the Sheffield Scientific School at Yale in 1936.

Edward L. Field, assistant treasurer since 1929, has been elected treasurer of the company. Mr. Field started with the company in 1920 and has served two terms as president of the Purchasing Agents' Association of Hartford County.

Other appointments made by the company are as follows: William C. Gaw, sales manager, has been elected vice president in charge of sales; W. Howard Spencer, cost supervisor, has been elected assistant treasurer; and John L. Way, II, has been elected assistant secretary.

D + V + X = HYPREZ
DIAMOND COMPOUNDS

Formula for finer faster finish

D — DIAMONDS—Clean, sharp, particles, uniformly graded to N.B.S. standards, evenly distributed for fast cutting, lapping and polishing.

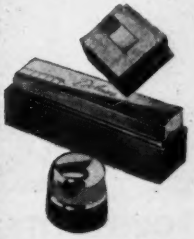
V — VEHICLE — An exclusive formula holding diamonds in permanent suspension, producing finer faster finishes.

X — EXPERIENCE—Thousands of the country's most important jobs have proved Hyprez versatility and savings of time, materials and production costs.

HYPREZ, the original Diamond Compound, is available in types and grades for every finishing requirement. Packed in 18- 9- and 5-gram sealed cartridges for use with the Hyprez Applicator Gun.



Valves, Seals Tools, Parts

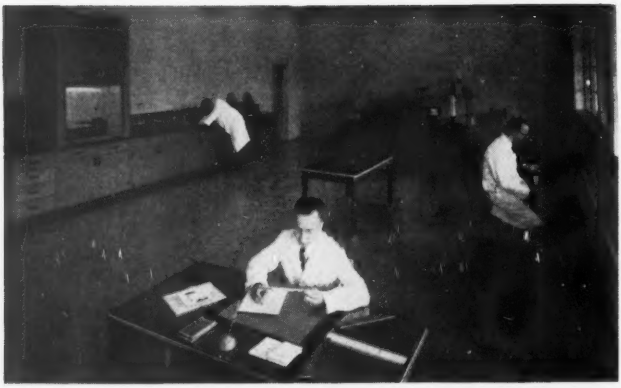


Dies, Molds Hobs, Gages

Write Dept. S-1052 for complete information or free demonstration



HYPREZ DIVISION
ENGIS EQUIPMENT COMPANY
431 South Dearborn St., Chicago 5, Ill.



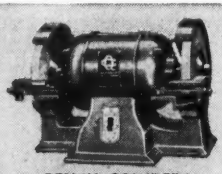
View of metallurgical laboratory section of Ipsenlab

Ipsen Establishes Developing and Testing Laboratory

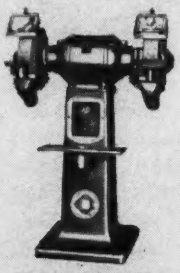
Ipsenlab of Rockford, Inc., 2125 Kishwaukee St., Rockford, Ill., a laboratory for the development of new techniques and the testing of the latest methods and equipment for the treatment of metals, has been established by Ipsen Industries, Inc., Rockford, Ill. In the laboratory, emphasis is placed on the application of various protective gas atmospheres for the treatment of ferrous and non-ferrous materials, as well as bright-hardening, carburizing, carbonitriding, annealing, tempering, and controlled oxidation tempering processes.

The laboratory is divided into two

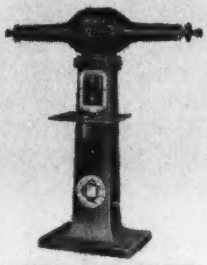
OK for
- durability
- freedom from downtime
- low cost



BENCH GRINDERS



FLOOR GRINDERS



HEAVY DUTY BUFFERS

QUEEN CITY grinders & buffers

Compare QUEEN CITY Grinders and Buffers with others costing much more . . . you'll find, as have hundreds of famous plants . . . they give extra value in long life, low maintenance and first cost. All the quality features . . . ball bearings, heavy duty motors, etc. . . . in a complete range of sizes and models. Get the facts. Write for prices and complete details.

QUEEN CITY MACHINE TOOL CO.
233 E. 2nd St. Cincinnati 2, Ohio

ORDER
STEEL PLATE SHAPES
TO CUT WASTE

Spend nothing on manpower
. . . nothing on machines

Protect your production schedules . . . assure accuracy . . . save time, money and manpower. Meet tomorrow's needs for shearing, punching, pressing and other shaping operations with By-Products' wide range of modern facilities.

No Patterns Needed

Working directly from blueprints, By-Products offers you the services of 150 major machines . . . uses your materials or our own to deliver ready-made parts suitable for quick finishing, quick assembly.

Prompt Delivery On Many Parts



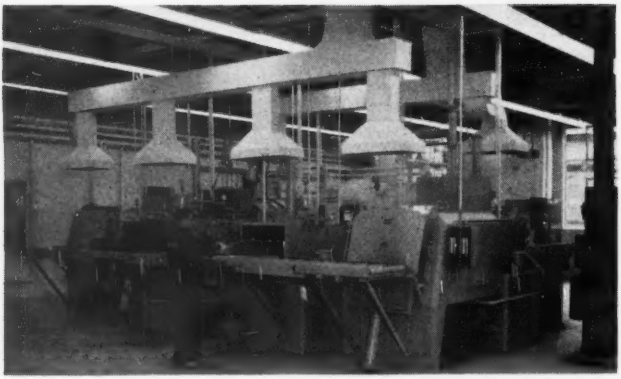
Write today for details on By-Products' flame-cutting, bending, welding, shearing, blanking, pressing and punching facilities. Prompt deliveries can be arranged on many parts. *You buy only what you need!* Address inquiries to: By-Products Steel Co., 517 Strode Avenue, Coatesville, Pa.

Plate that's shaped to save you money

BY-PRODUCTS STEEL CO.

LUKENS

A DIVISION OF LUKENS STEEL COMPANY



View of shop heat-treating section of Ipsenlab

sections: the metallurgical laboratory and the shop heat-treating section. Modern laboratory instruments and equipment are used. A small machine shop located in the laboratory contains equipment for the proper preparation of test samples before and after heat treatment. This equipment is also used for the construction of special test apparatus.

The heat-treating department of Ipsenlab contains the latest Ipsen production and experimental metal-treating units. Other Ipsen production heat-treating units are maintained in the shop for test purposes and to provide customers with complete and rapid processing of samples and pilot production runs.

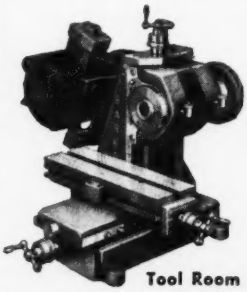
The BARKER "MILLER"

Will Efficiently Handle "101 TRICKY"

Second Operation Jobs on SMALL PARTS ordinarily requiring larger, expensive milling machines

Production Model





Tool Room Model
3 Micrometer feed screws. Ideal for instrument mfgs. and tool and die shops.

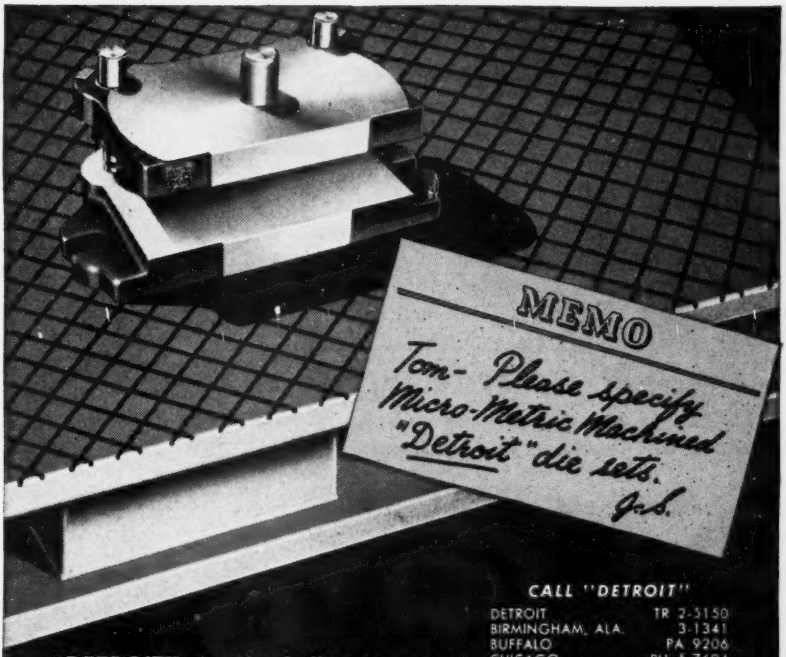
The Barker exclusive 3-way travel feature affords versatility of operation.
Rapid production rate with inexperienced help. Easy set-up for small run jobs.
Compare Barkers "plus" features with other small "millers," then decide.

Dealers Write for Proposal

TYPICAL END MILL OPERATION UTILIZING HEAD MOVEMENT ONLY

WRITE FOR LITERATURE AND COMPLETE INFORMATION

BARKER ENGINEERING COMPANY 500 GREEN ROAD CLEVELAND 21, OHIO



"DETROIT" standard die sets are Micro-metric jig-bored and machined to exceptionally close limits of parallelism, flatness and squareness with the guide-pin axis. This precision reduces strain warping, and results in longer die life and long, uninterrupted production runs. Order from your "DETROIT" representative.

CALL "DETROIT"

DETROIT	TR 2-5150
BIRMINGHAM, ALA.	3-1341
BUFFALO	PA 9206
CHICAGO	FU 5-7694
CINCINNATI	HU 7775
DAYTON	HE 3042
HAMILTON, CAN.	9-2683
INDIANAPOLIS	HU 5604
KANSAS CITY, MO.	VI 3558
LOS ANGELES	AD 7251
MILWAUKEE	GL 3-7170
MINNEAPOLIS	PR 1822
MONTREAL, CAN.	WI 1186
NASHVILLE	7-0437
NEWARK	MA 2-4318
PHILADELPHIA	VI 4-4084
PITTSBURGH	LO 1-4011
ROCK ISLAND, ILL.	RI 8-2814
ST. LOUIS	FR 6811
ST. PAUL	CE 1600
TOLEDO	MA 4510
WINDSOR, CAN.	2-1575

DETROIT DIE SET CORPORATION

2895 W. GRAND BLVD. • DETROIT 2, MICHIGAN

DETROIT DIE SET ★

Equipment available at the present time consists of controlled atmosphere furnaces for hardening, carbonitriding, martempering, carburizing, carbon restoration, annealing, normalizing, solution heat-treatment, and precipitation hardening, as well as various oil, water, and brine quenching equipment. Tempering equipment consists of furnaces suitable for conventional tempering, bright tempering, and controlled oxide coating. Generators to produce furnace atmosphere gases of the endothermic, exothermic and disassociated ammonia compositions are also available.

Lincoln Park Industries Acquires Standard Engineering Company

Lincoln Park Industries, Inc., Lincoln Park, Mich., has announced the acquisition of Standard Engineering Co., 13535 Seven Mile Rd., W., Detroit 35, Mich., whose activities include the processing, layout, and designing of machines, tools, inspection gages, and equipment used in producing completed parts and assemblies for the mechanical industries. Services are available for manufacturing production parts for civilian and defense production.

The present officers of the Standard Engineering Company are Gene DeMambro, president; Larry Howe, vice president; and Robert Nilsen, secretary - treasurer.

Severance DEBURRING CUTTERS HIGH SPEED CARBIDE

Unexcelled for power and hand deburring
Sectional pattern teeth give shearing action

Severance INSIDE DEBURRING CUTTERS
GROUND from the solid
Select 45° High Speed cutters from 28 standard sizes and 30° cutters from 35 sizes—from ¼" to 2" diameters.
45° 30°
Both angles can be supplied in CARBIDE

Severance OUTSIDE DEBURRING CUTTERS
GROUND from the solid
For speedy light deburring of rod ends and tubing O. D's., either offhand or in screw machines. Select 30° cutters from 14 standard sizes and 45° cutters from 10 sizes—up to 4 inch diameter.
ANGLES 30° & 45° C/L
Both angles can be supplied in CARBIDE

OUTSIDE CHAMFERING MILLS
Operate in machines to perform heavy chamfering without chatter —in above size range and angles.

HEADQUARTERS FOR DEBURRING AND CHAMFERING TOOLS DEVOID OF CHATTER

Severance HAND DEBURRING CUTTERS
"A Twist of the wrist" easily bites off the bur left by drill or punch.
Ten standard sizes for ¼ to 2" diameters.
Write for Bulletin 16-D

Complete REGRINDING Service — by New Tool Craftsmen — Savings are thus multiplied —

SEVERANCE TOOL INDUSTRIES, INC.
724 IOWA STREET • SAGINAW, MICH.
In Canada: 60 Front St., W., Toronto

MIDGET MILL GROUP
MIDGET MILLS
¼" Shanks
JUNIOR MILLS
LAB MILLS

TUBING GROUP
STANDARD Chamfering
SOLID (For Radius Lip)

COUNTERSINK GROUP
STANDARD
HEAVY DUTY
BALL SEAT REAMER

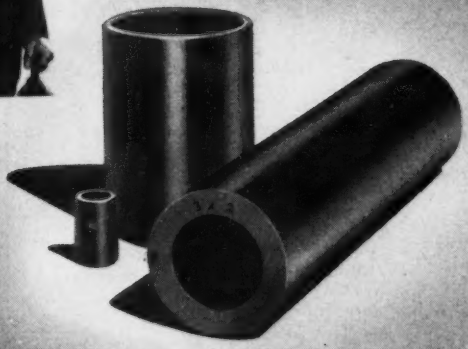
Buckeye



IT PAYS TO KNOW THIS MAN!

He's your Buckeye Distributor — A BEARING SPECIALIST — who stocks the bearing bronze that can "Go The Distance!" You can rely on his recommendations for

Fully Machined Bronze Maintenance Bars And Standard Stock Bearings



Bearings To Your Specifications . . .

For specials in any size, including slotted or split designs, flanges, lugs, oil holes and grooves, etc., write direct to The Buckeye Brass and Manufacturing Company, 6410 Hawthorne Ave., Cleveland 3, Ohio.



BARS • BEARINGS • BUSHINGS

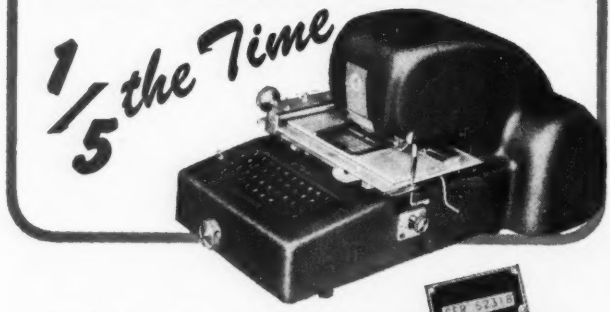
Fifth Annual A.I.E.E. Machine Tool Conference

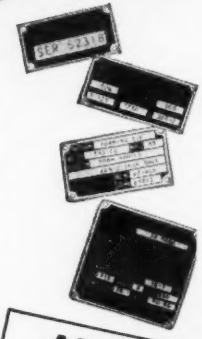
With headquarters at the Hotel Ten Eyck, the Fifth Annual A. I. E. E. Machine Tool Conference will be held in Albany, New York, October 29, 30, and 31, 1952. Wednesday afternoon, October 29, will be devoted to the presentation of papers and to discussions of some problems faced in recent application of machine drives. A banquet will be held Wednesday evening at which time Tell Berna, general manager of the National Machine Tool Builders' Association, will speak on "The Machine Tool Industry at the Crossroads."

Thursday morning, October 30, the conference will include a presentation of papers and discussions on short circuit protection and electrical safety requirements on machine tools. The afternoon session will deal with general control and motor problems as applied to machine tool applications. All day Friday will be devoted to plant visitations. Tours have been scheduled for the Watervliet Arsenal, the American Locomotive Company in nearby Schenectady and the motor, control, and turbine manufacturing divisions of the General Electric Company in Schenectady.

Registration for the conference will be held Wednesday morning, October 29, at the Hotel Ten Eyck in Albany. However, advance registration by mail may be made by writing to B. R.

How To
Mark Name Plates In
1/5 the Time





Cutting costs in these times is a good trick if you can do it. You can, on plates requiring detail marking, by using an Automark Electric Metal-Marking Typewriter. The operator lightly touches the key and the Automark does the rest, quickly and automatically. No dial to turn—no lever to pull. Marking output is increased five times and worker fatigue is greatly reduced. Write today for Bulletin 8-16.

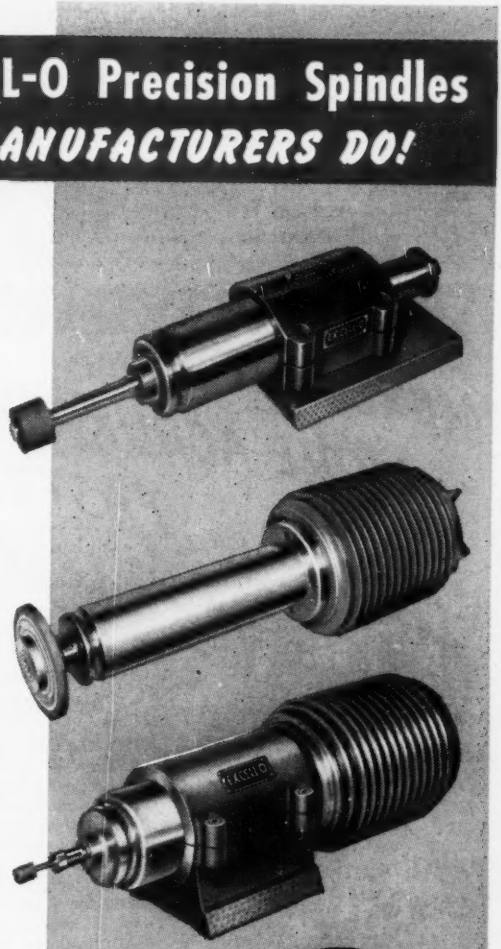
AUTOMARK
Electric Metal-Marking
TYPEWRITER
Manufactured Exclusively By
DEFIANCE MACHINE & TOOL COMPANY
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AGENTS
Desirable territories open for responsible representatives. Write giving complete information, lines carried and territory covered.

Specify EX-CELL-O Precision Spindles
GRINDER MANUFACTURERS DO!

You can insure the accuracy of your grinding equipment as many grinder manufacturers do—by standardizing on Ex-Cell-O Precision Spindles. Prominent machine tool builders install Ex-Cell-O Spindles as original equipment on internal grinders, universal grinders, surface grinders, gear grinders, tool and cutter grinders and special-purpose grinders.

Select the grinding spindles you need from the big Ex-Cell-O Spindle Catalog. If you don't have a copy write for one today on your company letterhead. There is no obligation, of course.



EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

51-15

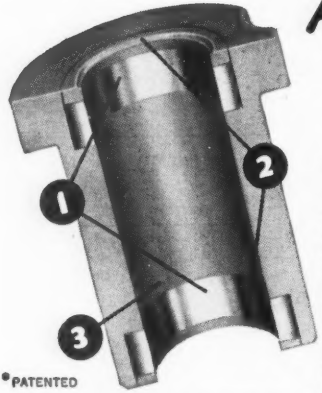
Shepard, Registration Chairman, Fifth Annual A. I. E. E. Machine Tool Conference, General Engineering Laboratory, General Electric Co., Schenectady 5, New York.

Second Annual Advertising Awards

The Joint Advertising Awards Committee has announced the Second Annual Advertising Awards to be given at the Triple Industrial Supply Convention in April, 1953. Sponsored by the National Industrial Distributors' Association and the Southern Industrial Distributors' Association, the award program is designed to encourage manufacturers to capitalize more fully, in their advertising and sales promotion, on one of the greatest of their sales assets—distribution through industrial distributors. Awards will be presented to those manufacturers whose advertising during 1952 was outstanding in telling users about the quality distribution behind their products in addition to selling the merits of their products.

Plaques will be awarded winners in each of six entry classifications. Engraved certificates of honorable mention will be given to the runner-up in each classification. Any manufacturer who normally sells all or part of his production through industrial distributors is eligible to enter his advertising.

MORE HOLES—
MORE ACCURACY—
FASTER—
AT LESS COST



*PATENTED

1. Tungsten carbide rings at the points of wear; 2. Steel rings protect drills and carbide; 3. Special hardened alloy steel body.

For information and prices write for Meyco Bushing Catalog No. 16.

MEYCO
Carbide Inserted Bushings
Are Doing It Daily!

HOW? Like this: (1) Last longer . . . with a life—in most cases—as long as solid carbide bushings at prices that come close to the prices of ordinary steel bushings; (2) Increased life for your drill jigs and fixtures; (3) Increased life for your drills and reamers; (4) Accuracy maintained for a LONG PERIOD of time; (5) Less non-productive machine time, less lost man-hours, because bushings need not be changed as often; (6) Inspection time saved, because of greater accuracy for a longer time; and (7) Less waste due to spoilage, for the same reason. Don't pass up a good bet! Get the dope on MEYCO Carbide Inserted Drill Jig Bushings today!

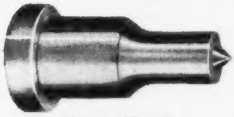


W. F. MEYERS CO., INC., BEDFORD, INDIANA

CLEVELAND PUNCHES and DIES



Every Size for EVERY NEED!



Screw Punch



Taper Shank



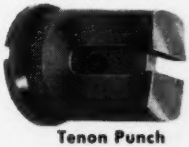
Straight Shank



Ripping Punch



Lattice Bar Punch



Tenon Punch

We stock about 400 sizes of the 21 Standard Round Cleveland Punches and matching Dies. When ordering these standard sizes you are assured of prompt delivery. Quantity stock production means a savings for you. When necessary, special sizes or shapes can be made to your specifications.

Backed by years of experience in the manufacture of small tools, we are constantly experimenting with new steels, alloys and processes to give you the best. Let us help you obtain maximum service from your Cleveland Punches and Dies. *Send for copies of our two-color wall instruction chart "Proper Care of Punches and Dies."*

A-3115

PUNCHING TOOLS & DIES

OFFICES AT
NEW YORK . . CHICAGO
DETROIT . . PHILADELPHIA
E. LANSING

THE CLEVELAND PUNCH & SHEAR WORKS CO.
U.S.A.
Established 1880

FABRICATING TOOLS

CLEVELAND 14, OHIO

• • • • • POWER PRESSES • • • • •

American Association of Machinery Importers Organized

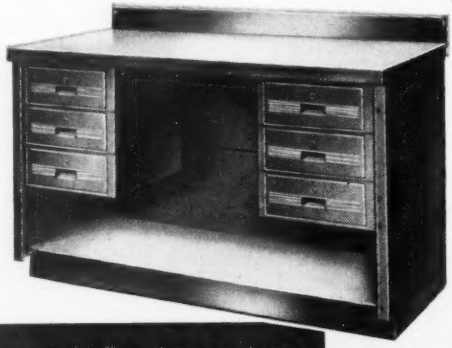
Leading American importers of European machinery have announced the formation of the American Association of Machinery Importers, Inc., with offices at 115 Broadway, New York City. It is the aim and purpose of the association to assure the American machine tool buyer that only the finest equipment will be imported and distributed by members, that machines imported by them will be represented fairly, and that complete servicing facilities and spare parts will be readily available.

At the first meeting of the association, the officers elected were Milton D. Thalberg, president; George R. Vonderahe, first vice president; and Henry A. Nau, second vice president. The firm of Graubard and Moskovitz was selected as counsel.

Charter members of the A.A.-M.I. consist of Eric R. Bachmann; British Industries Corporation; Ferrostaal Overseas Corporation; H. E. B. Machine Tools, Inc.; MBI Import-Export Company, Ltd.; Kurt Orban Company, Inc.; Permasco Division, Perrish Steel Products, Inc.; Stokvis-Edera & Company; and Triplex Machine Tool Company.



Milton D. Thalberg



STANDARDIZE ON STANDARD

HALLOWELL®

CABINET BENCHES

Finest all-steel construction, smooth, rigid working surfaces, free-sliding, carefully fitted doors, and roller bearing drawers make HALLOWELL Cabinet Benches outstanding. Simple, functional design blends perfectly with industrial interiors. Standard unit accessories permit you to *custom build* HALLOWELL Benches to your requirements. Write for descriptive literature. STANDARD PRESSED STEEL CO., Jenkintown 22, Penna.

HALLOWELL SHOP EQUIPMENT DIVISION

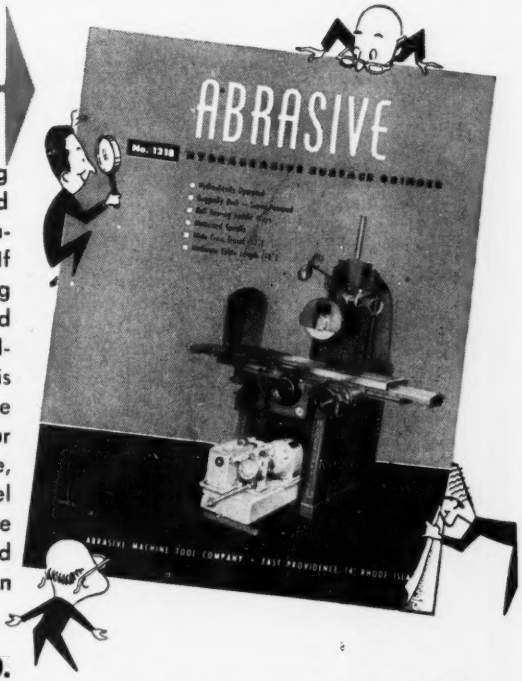
SPS

JENKINTOWN PENNSYLVANIA

Read all about this Surface Grinder!



Here's a brand new catalog — packed with facts and figures about the 1218 Hydrabrasive Surface Grinder. If you're concerned with getting better output and improved quality in your surface grinding operations, you'll find this hydraulically operated surface grinder fits right into your plans. The 1218 Hydrabrasive, because of its wide cross travel (12") and moderate table length (18"), takes the load off your heavy grinders on many classes of work.



ABRASIVE MACHINE TOOL CO.
20 Dunellen Road
East Providence 14, R. I.

Send *today* for your copy of this new catalog!

ABRASIVE
ACCURACY BOOSTS PRODUCTION

Abrasive Quality is Reflected in the Finish of Your Product

A. M. Stoner Receives Certificate of Merit

The Franklin Institute of the State of Pennsylvania has announced the award of its Certificate of Merit to Arthur M. Stoner, vice president in charge of engineering, The Jacobs Mfg. Co., West Hartford, Conn., for his development of a chuck and collet combination for lathes to hold cylindrical work being machined. Formal presentation of the award will be made to Mr. Stoner at the Institute's Medal Day in Franklin Hall on October 15.

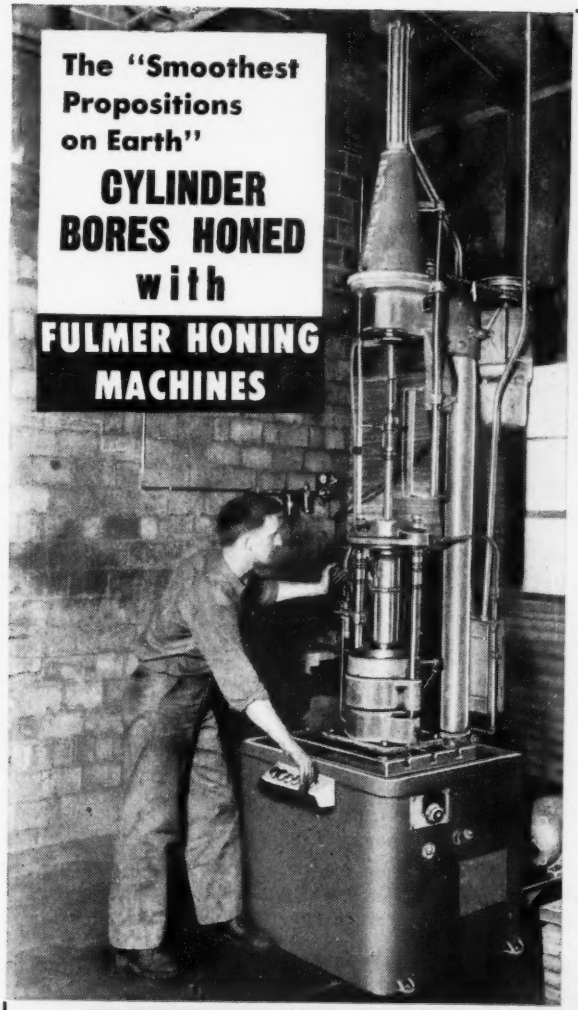
The citation accompanying the certificate states that the award is being presented to Mr. Stoner "in consideration of his achievement in producing outstanding advantages in the development of machine tool chucks resulting in an improved device known as the Spindle Nose Lathe Collet Chuck." This device has been in commercial use since 1949.

In 1931, Mr. Stoner began working as an engineer for Jacobs, and in 1936, as chief engineer, he carried on an extensive research and development program with a view to improving products and developing new products, special machinery, and tools for their manufacture. In order to devote more time to development work, Mr. Stoner was appointed vice president in charge of engineering in 1944.



A. M. Stoner





EVEN so-called "smooth as a mirror" finishing is "rough stuff" compared to the AMAZINGLY S-M-O-O-T-H AND STRAIGHT bores of cylinders finished with

FULMER HONING MACHINES

TOLERANCES as close as .0001 (±). 15 sizes available for diameters from ¼" to 30" and from 12" to 84" strokes.

FOR ferrous and non-ferrous metals, glass, plastic, etc.

Photo taken in plant of F. & F. Koenigkramer Co., Cincinnati, Ohio, honing bores of hydraulic cylinders.

Write For Your Copy:

"What To Know About Honing"

C. ALLEN FULMER CO.

1233 First National Bank Bldg. **Cincinnati 2, Ohio**



Illustration showing one of several Miller Motor Company "College of Cylinder Knowledge" mobile units now touring the country

Fleet of Traveling Cylinder Exhibits now Touring Country

To provide helpful knowledge on the proper use, maintenance, operation, and testing of air and hydraulic cylinders, Miller Motor Co., Chicago, Ill., has launched a fleet of "College of Cylinder Knowledge" mobile units which are now touring the country. The units of the fleet are rotated among company representatives so that each man has the use of a unit for weeks at a time. The units can be driven directly into or near industrial plants, thus allowing the representative to give demonstrations, explanations, and instructions to visiting groups by prearranged appointments.

The exhibits consist of cylinders in actual operation. A good example of the modern development of dual-pressure boosters for saving air, space, weight, and cutting costs in developing up to 10,000 p.s.i. hydraulic output from regular plant air is shown. The exhibit also shows how air and oil can be used together in one cylinder unit

LUERS
PATENTED CUTTING OFF TOOL HOLDERS
PATENTED CUTTING OFF BLADES
ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.
Manufactured by
J. MILTON LUERS. 12 Pine Street, Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.

The winning hand for PRECISION



INDIA® and HARD ARKANSAS* OILSTONE FILES of NORTON® abrasives

Close tolerances demand their use — the shape of a die, the edge of a cutting tool, or the final fit of a part. NORTON Abrasive electric-furnace INDIA is favored for general stoning, and natural HARD ARKANSAS for the very finest finish. Shapes for every need — round, flat, square, triangular, tapered, as well as bench stones. Nothing can take the place of oilstone files in die-making, in the toolroom, or in precision production. Get the benefit of better stoning and honing.



Keep handy a copy of the NORTON Abrasives "OILSTONE" Catalog No. 19. Request it today from Dept. MS-10.

*Trade Mark

BEHR-MANNING

BEHR-MANNING CORPORATION

▲ COATED ABRASIVES
▲ SHARPENING STONES
▲ PRESSURE-SENSITIVE TAPES

a division of NORTON Company

Main Office and Plant, Troy, N. Y., U. S. A.
For Export:
NORTON BEHR-MANNING OVERSEAS INC.

to provide a smooth, accurate, chatter-free movement of hydraulic power from ordinary plant air input. Various other air and hydraulic-cylinder applications are also included in the exhibit.

New Plant to Be Built by Carborundum Metals

A new plant for the production of zirconium and hafnium sponge metals will be built by The Carborundum Metals Co., Inc., a recently formed subsidiary of The Carborundum Co., Niagara Falls, N. Y. The new plant will be located about 30 miles southeast of Niagara Falls in Newstead, New York, and will be situated on an 18½-acre plot. Manufacturing facilities will consist of three buildings with modern structure employed throughout. The buildings will be constructed of structural steel framing and concrete block walls. Green colored polyethylene plastic panels will also be used to provide for an attractive appearance. Manufacturing equipment of the latest design will be installed and will include the most modern equipment for the purpose of dust and fume control.

The Carborundum Metals Company, Inc., was created for the purpose of supplying zirconium and hafnium to the Atomic Energy Commission. Present arrangements provide for the sale of approximately 150,000 lb. of zirconium and hafnium sponge metal per year.

Drill Hardened Steels without Annealing –



With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon—high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

You Harden It—We'll Drill It—With "HARDSTEEL"

BLACK DRILL COMPANY, INC.
1372 East 222nd St. • Cleveland 17, Ohio

Also makers of—
BLACK DRILLING UNITS—AUTOMATIC, SELF-CONTAINED—FOR COST-CUTTING PRODUCTION ON ALL MATERIALS
Write for information



Specify Adams

for high quality gears made *EXACTLY* to your specifications

Regardless of quantity or type, you'll **profit** by specifying Adams custom made gears for your product. Made on the most modern gear cutting machines by **skilled** workmen, Adams gears are quality controlled to guarantee exact conformance to your specifications. Write today for further information. THE ADAMS COMPANY, 1942 Cypress Street, Dubuque, Iowa.

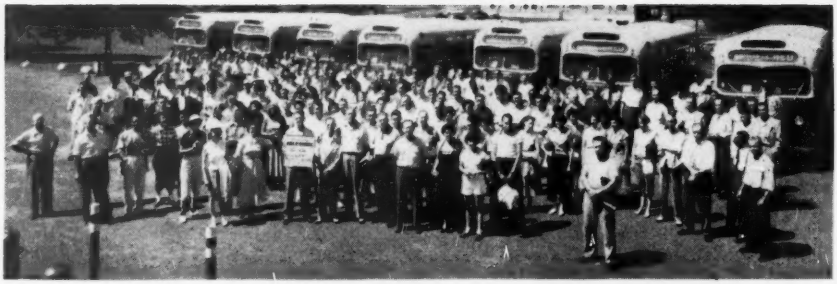
The ADAMS Compa

Dubuque, Iowa, U. S. A.

ESTABLISHED 1883

GEARS

FINE GEARS MADE TO YOUR SPECIFICATIONS



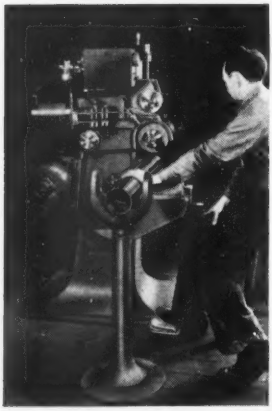
Holo-Krome employees at annual outing

Holo-Krome Holds Annual Outing

Each year workers of The Holo-Krome Screw Corp., Hartford, Conn., hold their annual outing, at which time refreshments are served and games and races are conducted. This year the annual outing was planned as a "mystery ride" to a destination unknown. Busses were chartered, and the employees were taken to an attractive spot about 25 miles from Hartford.

W. A. Purtell, president and general manager, and W. C. Stauble, executive vice president and director of sales, were among the persons who attended the outing. Mr. Purtell is well known among industrial supply distributors and is the newly appointed senator from Connecticut, filling the unexpired term of Senator Brien McMahon.

STEEN PIPE AND TUBE CUT-OFF MACHINES



For faster cutting

If you cut pipes and tubes . . . in small or large quantities . . . you can cut faster—easier—with a Steen Cut-Off Machine. Available in hand and automatic air-operated models for pipes and tubes up to 12" diam. *Also, Manufacturers of Cut-Off Wheels . . . Chaser and Wheel Grinders. Request Circulars Today.*

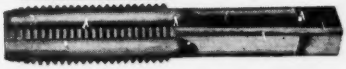
Continental MACHINE CO.
SINCE 1919
1952 N. MAUD AVE. • CHICAGO 14, ILL.

CALL Sid Tool COMPANY "HARD TO FIND TOOLS FOR STOCK DELIVERY"

Why Wait for SPECIAL TAPS?

we have them in STOCK for IMMEDIATE DELIVERY

HIGH SPEED **SPECIAL** RIGHT HAND TAPS



SIZE	THREAD
4	32-48-60-64
5	30-32-36-48-80
6	36-40-48-56-60
7	32-40
8	24-30-36-38-40-44-48
9	24-28-32-40
10	28-30-36-40-48-64
12	20-28-32-36
14	20-24-28
1/16	60-64
5/64	72
3/32	48
7/64	48-56
1/8	32-40
5/32	32-36-40
9/64	36-40
11/64	36
3/16	20-24-32
13/64	32
7/32	24-28-32
1/4	18-24-26-27-30-32-36-40
5/16	16-20-22-27-28-32-40
3/8	12-16-18-20-27-28-32-36-40-48

SIZE	THREAD
7/16	12-16-18-22-24-27-28-30-32-36-40
1/2	12-14-16-18-22-24-26-27-28-30-32-40
9/16	16-20-24-27-28-30-32-40-48
5/8	12-14-16-20-24-27-28-32-36-40
11/16	11-16-18-20-24-27-28-30-32
3/4	9-11-12-14-18-20-24-26-27-28-32
13/16	10-14-18-20-32
7/8	10-12-16-18-20-24-27-28-32
15/16	8-9-10-12-14-16-18-20-24-32
1	10-12-16-18-20-24-27-32-40
1-1/16	12-14-16-18-20-24
1-1/8	8-10-14-16-18-20-24-32
1-3/16	8-10-12-14-16-18-20-24
1-1/4	8-10-14-16-18-20-24-32
1-5/16	12-14-16-18-20-24-32
1-3/8	8-10-14-16-18-20-24
1-7/16	8-10-12-16-18-20-24
1-1/2	8-10-14-16-18-20-24-28

SIZE	THREAD
1-9/16	18-20-24
1-5/8	5½-8-10-12-13-16-18-20-24
1-11/16	10-12-14-16-18-20-24
1-3/4	8-10-12-14-16-18-20-24
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20-24
1-15/16	8-10-12-14-16-18-20-24-28
2	4½-8-10-12-16-18-20
2-1/16	12-14
2-1/8	12-16-20
2-3/16	12-16
2-1/4	4½-8-12-14-16-18
2-5/16	12-18
2-3/8	12-16-18
2-1/2	8-10-12
2-9/16	18
2-5/8	12-16-20
2-3/4	16
2-7/8	8-12-16
3	8-16
3-1/4	8-12-16
3-1/2	8-12-16
3-7/8	6
4	8-12

HIGH SPEED LEFT HAND TAPS

SIZE	THREAD
0	80
1	56-64-72
2	56-64
3	56
4	32-36-40-48
5	40-44
6	32-36-40
8	32-36-40
10	24-30-32-40
12	24-28-32
1/4	20-28-32
5/16	18-20-24-28-32

SIZE	THREAD
3/8	16-24-32
7/16	14-20-28
1/2	12-13-20-28
9/16	12-18-20-24
5/8	11-12-18-20-24
11/16	11-16-24
3/4	10-16-18-20
13/16	16
7/8	9-12-14-18-20
1	8-12-14-16-18-20
1-1/8	7-12
1-1/4	7-12-16-18

SIZE	THREAD
1-3/8	6-8-10-12-16-18-20-24
1-7/16	8-10-12-14-16-18-20
1-1/2	6-8-10-12-16-18-20
1-9/16	8-10-12-16-18-20
1-5/8	8-10-12,14-16-18-20
1-11/16	8-10-12-14-16-18-20
1-3/4	8-10-12-14-16-18-20
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20
1-15/16	8-10-12-14-16-18-20
2	4½-10-12

• ***SPECIAL AND LEFT HAND DIES IN STOCK***

Prices on Application—We are always adding new sizes

NOTE: Oversize—Undersize—Acme—Metric—64th—32nd Size Taps Available for Quick Delivery.

• Are you on our monthly mailing list? Write us today!

SID TOOL COMPANY, INC.

CUTTING TOOL SPECIALISTS

126 LAFAYETTE STREET • NEW YORK 13, N. Y.

PHONE: DE 3-4270

Metal-Working News in Brief

Appointments to newly created executive positions on the engineering staff of Carboloy Department of General Electric Co., Detroit 32, Mich., are as follows: **E. W. Engle,** product and process engineering manager; **E. E. George,** design and application engineering manager; **R. A. Canning,** production engineering manager; and **R. L. Brownlee,** administrative engineer.

Stanton C. Gunnett, manager of the Mac-It Screw Department of Strong, Carlisle & Hammond Co., Cleveland, Ohio, died recently as a result of a heart ailment.

— o —

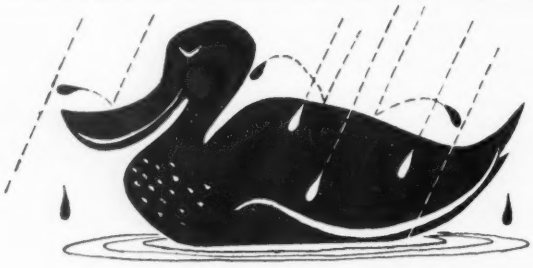
The United States Drill Head Co., Cincinnati, Ohio, manufacturer of fixed center and multiple spindle heads, has purchased an additional building, part of which will be used by the newly expanded engineering department. One entire floor will also be set aside for the purpose of storage.

— o —

Raymond J. Groh, supervisor of office service for United States Steel Supply Division, has assumed general supervision of United States Steel consolidated office services and communications at 208 S. LaSalle St., Chicago 90, Ill.

— o —

Harry L. Smith, Jr., has been appointed staff manager of product sales for Aluminum Company of America, Pittsburgh 19, Pa. **W. T. Mitman** will succeed Mr. Smith as manager of sheet and plate sales.



HOW TO DUCK THE WELD-SPATTER PROBLEM

Use Protect-O-Metal and weld spatter wipes off as easily as water from a duck's back! With Protect-O-Metal you speed welding and save up to 85% of weld cleaning time and labor. Brush or spray P. O. M. in weld seam and on adjacent metal—weld—then brush off spatter in seconds.
Just a little P. O. M. goes a long way too—costs less than 1/10¢ per foot of weld protected, saves up to three times its cost in time savings alone. Order a trial gallon ($3.25) satisfaction guaranteed or invoice will be cancelled.

PROTECT-O-METAL
POM
G.W.SMITH

G. W. SMITH & SONS, INC., 5407 Kemp Road, Dayton, O.

Never before A TAPPING MACHINE WITH ALL THESE ADVANTAGES

Ettco-Emrick

FOOT OR AIR OPERATED 72A TAPPING MACHINE

Here is a fast, versatile foot or air operated tapping machine that puts high production precision tapping within easy reach of all manufacturers. Here's what it offers—

- **VERSATILITY.** Interchangeable single spindle tapping units and multiple heads permit fast changeovers from job to job.
- **HIGH SPEED.** Foot or air pressure does the work with a minimum of effort. Both hands are free to handle the part being tapped.
- **ECONOMY.** Low initial cost and high production rates add up to big savings.
- **BUILT-IN SENSITIVITY.** No skill or delicate touch is needed—it's ideal for unskilled operators.
- **ADAPTABILITY.** There's a lubrication setup for any tapping—gravity feed for minimum tap lubrication—a pumped oil bath for continuous flow.

For details, ask your distributor for Bulletin #72A.



ETTCO TOOL CO., INC.
594 Johnson Ave. · Brooklyn 6, N.Y.

Metal-Working News in Brief

Farrel-Birmingham Co., Inc., Ansonia, Conn., has announced the transfer of **Elmer F. Myers,** sales engineer, to Fayetteville, North Carolina. Mr. Myers, who formerly covered the New England area, will now handle sales in Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Florida, and Alabama.

E. W. Bliss Co., Canton, Ohio, has announced the appointment of **H. C. Splittorf** to the position of credit manager, succeeding **W. H. Garrison** who was recently appointed treasurer and assistant secretary.

— o —

The Denison Engineering Co., Columbus, Ohio, has announced the opening of a branch office at 565 N. Prairie St., Hawthorne, Calif., to serve the Greater Los Angeles area. The branch will also serve as headquarters for the company's west coast sales and service operations.

— o —

William N. Jove, 63, Norton Company abrasive engineer in Chicago, became the company's 15th 50-year man at the annual outing of the 25-Year Club.

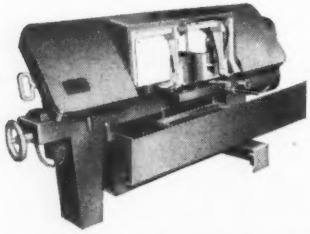
— o —

Westcott Chuck Co., Oneida, N. Y., has announced that warehouse stocks have been set up at 320 S. 66th St., Houston, Texas, and at 1827 S. Hope St., Los Angeles, Calif., to serve its dealers in the Southwest and on the west coast.



Kalamazoo
METAL CUTTING BAND SAWS

No stooping, no fumbling . . . just swing saw cover open and everything is at your fingertip. Release blade tension, remove blade, insert new one and tighten. It's as simple as that! Result? Minimum loss of time, less chance of damage to blade and of injury to operator.



This is but one of many exclusive Kalamazoo features that add up to lowest cost intermittent or continuous cutting. It will pay you to specify Kalamazoo Metal Cutting Band Saws . . . three sizes, available with coolant system and casters.

MACHINE TOOL DIVISION
Kalamazoo TANK and SILO CO.
1010 HARRISON ST., KALAMAZOO, MICHIGAN

Bay State Taps, built for precision performance, satisfy all requirements of a good production tool... quality and quantity of threaded product.. ...



On nearby shelves of industrial supply distributors.

BAY STATE TAP & DIE CO.

MANSFIELD, MASS.

Metal-Working News in Brief

The Morse Chain Company has announced the appointment of **Edward F. Whittemore** as purchasing agent for the company's Detroit plant.

— o —

Clifford S. Vaughn has been named assistant western regional manager of The Bellows Company of California. Mr. Vaughn will make his headquarters at the home office in Los Angeles.

Milton F. Beecher, head of Norton Company's research and development laboratories since 1941, has retired as vice president and director. As chief of these facilities, Mr. Beecher will be succeeded by **Wallace L. Howe,** director of research and development.

— o —

Hy-Pro Tool Co., New Bedford, Mass., has announced the appointment of **Harvey F. Phipard, Jr.,** to the position of director of research and engineering; **Edward J. Locke, Jr.,** to the position of chief engineer; and **George E. Jenney, Jr.,** to the position of master mechanic.

— o —

United States Steel Company has announced the appointment of **Orville A. Zimmerman** as office manager of the Chicago district and **Sylvan A. Boxdorfer** as office manager of the St. Louis district.

— o —

Charles S. Walker, 441 Park Ave., Kent, Ohio, has been appointed factory representative for the State of Ohio by Morey Machinery Co., New York 13, New York.

KILL moisture absorption



with DESPATCH ROD DRYING OVENS

For all types of baking, drying and ageing

★

Ovens can be decked—2-4-6 units

★

Automatically controlled—set it and forget it

★

Mesh shelving for total heat circulation

★

Conveniently portable for entire shop use

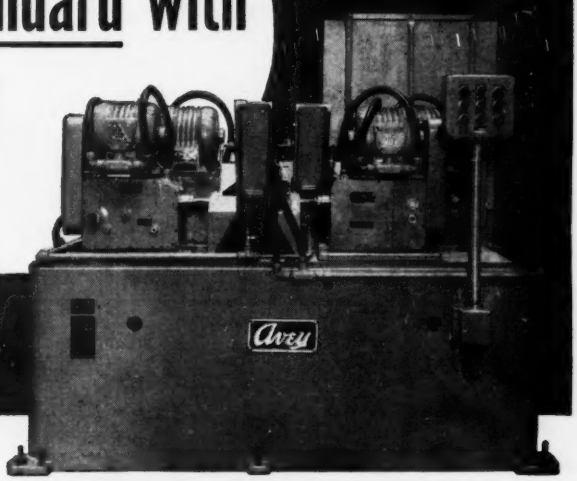
Electrodes in storage tend to pick up moisture—particularly low hydrogen, stainless steel and non-ferrous types. Despatch "WRD" Welding Rod Ovens provide lots of storage room in 10 spacious compartments and do a thorough, steady, dependable dehydrating job. *Specifications:* Outside dimensions—18" x 19" x 18". Max. Temp. 550° F; 1500 Watts; 250 lbs. rod capacity. *Write for Bulletin.*

DESPATCH OVEN CO Established in 1902

381 DESPATCH BUILDING
MINNEAPOLIS 14, MINNESOTA

Special Jobs are Standard with AVEY

Produces 2400 Parts per Hour



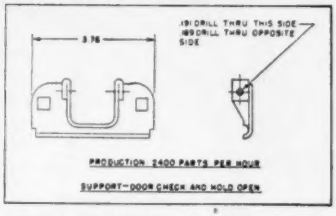
SPECIAL MAGAZINE FEED DRILLING MACHINE

S. O. No. 17893—Consists of two pairs of No. 1 Avey Cam Feed Units mounted horizontally and opposed on a well designed fabricated steel base. Each pair of Units can be operated individually or collectively and each pair of Units is arranged with loading chute for magazine feed.

The parts are gravity fed down the chute to the drilling position.

Fixture—At the drilling position they are clamped automatically by an air cylinder which clamps the part on the forward stroke. The cylinder is arranged with a small ejector finger which automatically ejects part which passes into a chute in rear of machine. All clamping pressure is transmitted to the ears with final location in the square holes.

SEND FOR ENGINEERING BULLETIN



There's an *AVEY* to fit your particular job.

Consult the yellow pages in your phone book —under Machine Tools—for our nearest representative, or write direct to our factory.

THE *Avey* DRILLING MACHINE CO.
Cincinnati 1, Ohio

Metal-Working News in Brief

Eric R. Bachmann, 27-11 41st Ave., Long Island City 1, N. Y., has been appointed exclusive United States distributor for the complete line of machine tools manufactured by Ludwig Loewe & Co. A. G., Berlin, Germany, including lead screw and production lathes; vertical, horizontal, and universal milling machines; universal tool and cutter grinders; special reamer honing machines; and high precision optical profile grinders.

— o —

John A. Clark, Jr., formerly with Tinnerman Products, Inc., has joined The Warner & Swasey Co., Cleveland, Ohio, as controller.

— o —

Whitney Chain Co., Hartford, Conn., has announced the appointment of **Anthony J. Swisler** as regional manager for the west coast. **George A. Banton** has been named district manager of the southern California and Arizona territories.

— o —

The Adams Co., Dubuque, Iowa, has announced the recent death of its president, **Eugene Adams.**

— o —

Ralph O. Bettison has been appointed field engineer in the Pontiac, Michigan, area by The Bellows Co., Akron, Ohio. Mr. Bettison will represent the company in the entire county of Livingston and parts of McComb, Oakland, and St. Clare Counties.

Measure *Pitch Diameter* with the *NEW* SCULLY 3-WIRE THREAD GAUGE





Only $4.95

Patent applied for

NO LOST TIME FUMBLING WITH LOOSE WIRES. ONE SUBTRACTION GIVES PITCH DIAMETER.

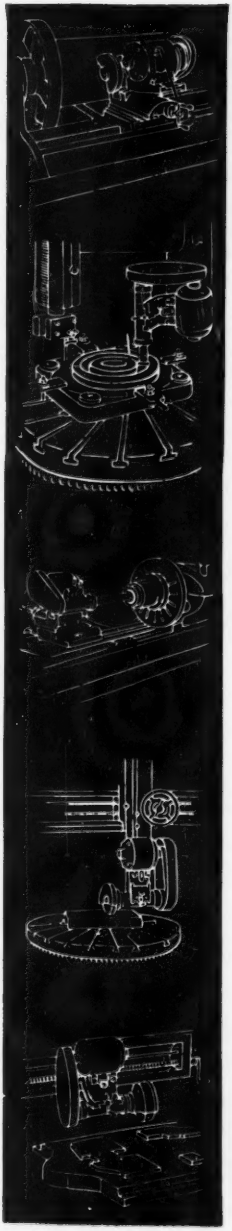
One hand holds and locates the three wires comfortably. Each unit is calibrated and uses "Best Wire Size" for one pitch. Measures any diameter up to 2½". Tolerance-plus .0000, minus .0002".

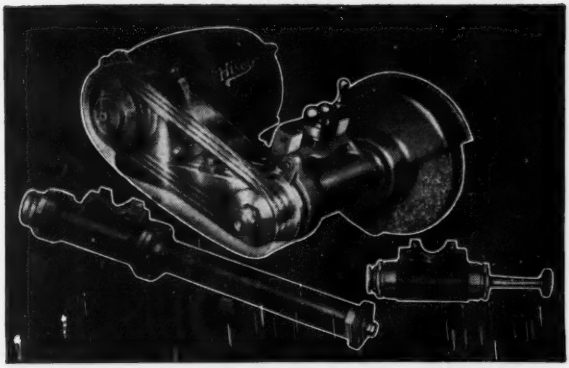
Available in following American Standard Pitches: 32, 28, 27, 24, 20, 18, 16, 14, 13, 12, 11, 10 threads per inch.

Each gauge for one pitch only.

ORDER DIRECT FROM:

SCULLY MACHINE COMPANY
62 Walter Street Bridgeport, Connecticut





YOUR LATHE
is a precision Grinder!

Either internal or external—your boring mill, too—and planer and other machine tools in your shop, are now capable of precision grinding of rolls, surface plates, bearings, journals, mandrels, cutters, etc. They merely require a HISEY Wide Range Precision Grinder attached to their regular tool holding fixture.

Built in a number of sizes and types, they are adaptable for production work as well as the thousand and one odd grinding jobs which crop up in every shop and tool room.

The V-Belt drive affords the most efficient and economical speed and permits rapid speed changes as required.

Driven by constant speed motor, a steady, uniform speed is maintained as required for best results.

Catalog 72-MB on Request

Hisey THE HISEY-WOLF MACHINE CO.
CINCINNATI 8, OHIO

Metal-Working News in Brief

Raybestos-Manhattan, Inc., Passaic, N. J., has announced the opening of a new warehouse at 4500 York St., Denver, Colo., which is designed for proper storage conditions and quick truck deliveries.

— o —

W. C. Sonnie and **Douglas E. Porter** of Cleveland Carbide Sales Company have been appointed exclusive representatives in the Cleveland territory by Super Tool Company for its special carbide cutting tools.

— o —

Norton Co., Worcester, Mass., has announced the appointment of **David Reid**, former assistant superintendent of organic products, to the position of superintendent of grain and bond plants. **Roger J. Dufresne** succeeds Mr. Reid as assistant superintendent of organic products.

— o —

Cleco Division of Reed Roller Bit Co., Houston, Texas, has announced the appointment of **Harry P. Leu, Inc.** Orlando, Fla., and **Ace Equipment & Supply Co.**, Hillside, Ill., as distributors for Cleco products in their respective areas.

— o —

Wiedemann Machine Co., Philadelphia, has announced the appointment of **Four States Machinery Co.**, 5304 W. Chicago Ave., Chicago, Ill., as representative in Illinois, Iowa, northwestern Indiana, western Michigan, and southeastern Nebraska for its line of turret punch presses.



MODELS AVAILABLE TO GIVE YOU PRESSURES RANGING FROM 80 LBS. UP TO 2875 LBS.

Can bring you efficiency in several ways:

1 — in single installations where operator's fatigue is a factor or where the location of hand-operated clamps would be impractical.

2 — in multiple installation controlled by a single valve.

3 — in multiple installations with sequence valves operating certain clamps at predetermined intervals.

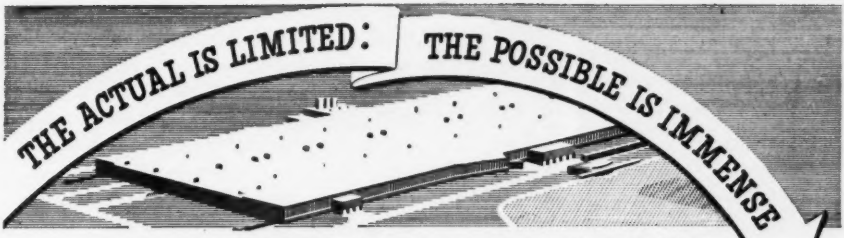
Sales offices in principal cities. Teletype DE 49

Send for new folder giving further information.

KNU-VISE PRODUCTS **LAPEER MFG. CO.**

3048 DAVISON ROAD • LAPEER, MICHIGAN

WESTERN DIVISION: 422 MAGNOLIA ST., GLENDALE, CALIF.



NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

©LE Co. 1952

WELDED DESIGN INCREASES RIGIDITY WITHOUT INCREASING COST

By Eric Hartmann, Experimental Research Engineer
The Porter Cable Machine Co., Syracuse, New York

BY changing over the design of our belt platen support to welded steel construction, we have cut deflection over 90%. The former cast construction, (Fig. 1) would deflect from .017" to .020" under 400 pound table pressure. The present welded steel design deflects only .0015" to .002" ... 10% of its original value.

Since steel is 2½ times more rigid than gray iron, it was possible to develop a more efficient product design on the platen itself without changing the basic dimensions of the machine or without increasing costs. On machine tools like ours, rigidity is basically important as it directly affects ultimate accuracy and efficient operation of the equipment.

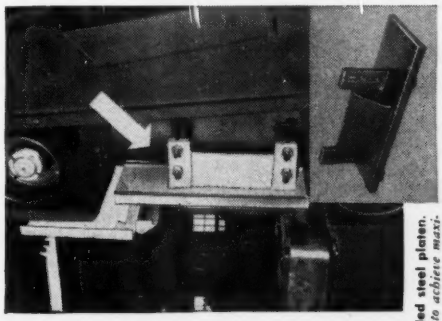


Fig. 3—Detail of Column *on Porter Cable BG-8 Grinder. Shows assembly of belt platen support governing the ultimate accuracy and efficiency of the machine.*

Inset: Rear view of welded steel platen. *Shows efficient use of steel to achieve maximum strength and rigidity per pound of metal.*

WELDED DESIGN ALWAYS SAVES STEEL AND LOWERS COST



Fig. 1—Former Design—*Belt platen support for grinder was originally a casting. Required machining operations to finish the front face and the mounting arms.*



Fig. 2—Present Design in Welded Steel—*Is simpler to fabricate than the original construction. Components are pre-machined prior to welded assembly to simplify manufacture.*

HERE'S HOW

Machine Design Sheets free on request. Designers and Engineers write on your letterhead to Dept. 255,

THE LINCOLN ELECTRIC COMPANY
Cleveland 17, Ohio

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

Metal-Working News in Brief

William J. Kingsley has been appointed assistant general sales manager of The Carborundum Co., Niagara Falls, New York.

— o —

Firth Sterling, Inc., Pittsburgh, Pa., has announced the appointment of **Thomas E. Pickering** as sales promotion manager.

Expansion of its manufactured products to include many other types of portable power tools in addition to its original line of portable electric saws has caused Skilsaw, Inc., Chicago, to change its name to **Skil Corporation.**

— o —

The Bellows Co., Akron, Ohio, has announced the appointment of **Russel V. Mills** as field engineer in the East Boston, Massachusetts territory.

— o —

Milford Rivet & Machine Co., Milford, Conn., has announced the acquisition of **Pacific Rivet & Machine Co.,** Alhambra, Calif. The newly acquired company will be known as The Milford Rivet & Machine Co., Pacific Division, and will manufacture tubular rivets, cold-headed specialties, and rivet-setting machines.

— o —

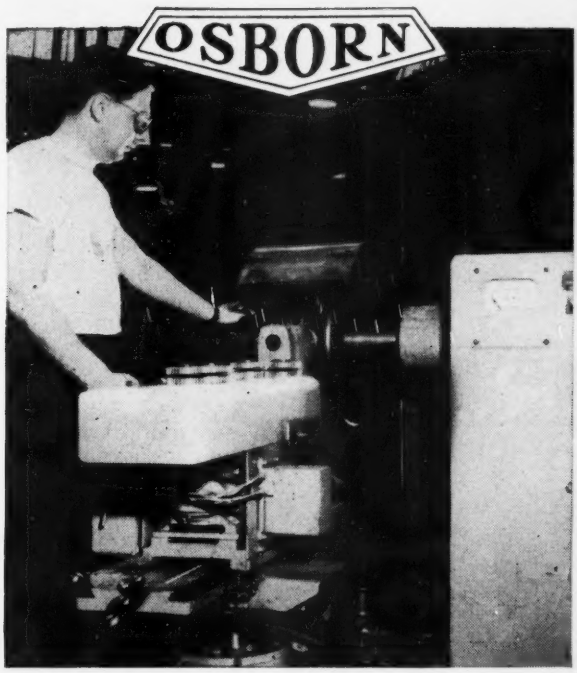
Ernest S. Kopecki has joined The Carborundum Co., Niagara Falls, N. Y., as assistant public relations manager and will be responsible for conducting editorial relations with the industrial trade press.

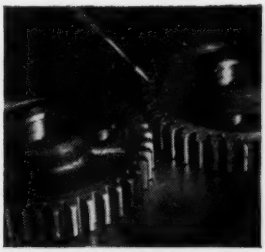


DYNAPRENE is better because it lasts longer. It is made of an exceptionally tough neoprene compound developed after extensive research and experience. It is made by the continuous vulcanizing process that guarantees accurate centering and even cure, eliminating thin, weak spots. DYNAPRENE is a truly modern cord made to withstand the rigors of constant use yet is priced only slightly higher than other types of cord that need frequent replacement.

Be sure to specify Whitney Blake type SO, SJO or SV-type neoprene jacket for your cord requirements.

WHITNEY BLAKE CO.
WELL BUILT WIRES SINCE 1899
NEW HAVEN 14, CONNECTICUT





RESULTS ARE UNIFORM. Burrs and sharp edges are removed uniformly. Every gear has smooth, uniform, rounded edges. Surfaces are blended. These gears were deburred on the machine shown at the left.



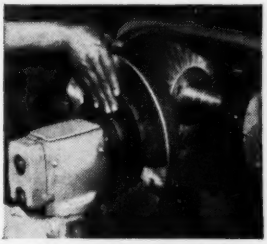
SET-UP IS SIMPLE. The machine is highly adaptable where production involves either large runs of a few parts or small runs of many different types and sizes of gears. Machine setups may be quickly made by unskilled operators. The complete brushing cycle is controlled automatically by the electronic timer which is set for any desired brushing interval to suit the size, shape or condition of part being brushed.

Formerly 20... now deburrs 125 per hour

A new machine . . . the Osborn Work Holder Brushing Lathe . . . now deburrs gears and similar parts *at the push of a button!*

In the plant of Caterpillar Tractor Co., this automatic machine deburrs and finishes gear teeth *six times as fast* as the former hand method. Production now is 125 gears per hour. Output formerly was 20. Burrs and sharp edges are now removed uniformly. Every gear tooth has smooth, rounded edges and surfaces are blended.

Find out how you can speed deburring and improve product quality with this versatile Osborn machine. Call your **O**sborn **B**rushing **A**nalyst today or write *The Osborn Manufacturing Company, Dept. 845, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



OPERATION IS SPEEDY. The operator mounts the gear easily and quickly. The gear advances to the face of two rotating Osborn brushes and the edge of the gear teeth makes contact with the brushes. To assure fast, positive action on each piece brushed, an automatic control reverses the direction of brush rotation on every cycle of operation. This machine deburrs 14-inch hypoid gears in 1½ minutes compared to 25 minutes for former method.

Osborn Brushes

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES

INVESTIGATE IT TODAY
for *your* problems. Users report time savings ranging from 20% to 1570% with the Osborn Work Holder Brushing Lathe. Let us demonstrate what it can do for you!

Metal-Working News in Brief

The Billings & Spencer Co., Hartford, Conn., has announced the appointment of **J. B. Lyons** as direct southern sales representative with headquarters in Atlanta, Georgia. Mr. Lyons will cover the Virginias, District of Columbia, the Carolinas, Georgia, Florida, Alabama, Kentucky, Mississippi, Tennessee, and a portion of Maryland.

H. U. Rogness has been appointed authorized district representative for C. A. Norgren Co., Englewood, Colo., and will handle the company's line of oil fog lubricators, pressure regulators, air filter relief valves, and hose couplings and assemblies in Minnesota and the Dakotas.

— o —

William E. McCullough, 842 Thorn St., Sewickley, Pa., has been appointed Tri-State sales engineer for Capewell Mfg. Co., Hartford, Conn., manufacturer of hack and band saw blades, ground flat stock, pipe fitters' tools and machines, and specialty nails.

— o —

Frank J. Fales has been appointed chief engineer for Nebel Machine Tool Co., Cincinnati, Ohio. Mr. Fales' responsibilities will include design work on the company's line of lathes.

— o —

Richard M. Tuthill has been appointed district representative for Commander Mfg. Co., Chicago, Ill., manufacturer of the "Multi-Drill" and various other production type tools.

ENGRAVE

PANELS OF ANY DIMENSIONS

IN YOUR OWN SHOP

with the Engravograph

PORTABLE MODEL I-S



The only portable machine which reproduces 15 sizes from one master alphabet.

The only one with adjustable copy holding slides for multi-line engraving in one set-up.

Self-centering holding vise for nameplates.

Send for Booklets

I-S 27 portable model • H 27 heavy duty model

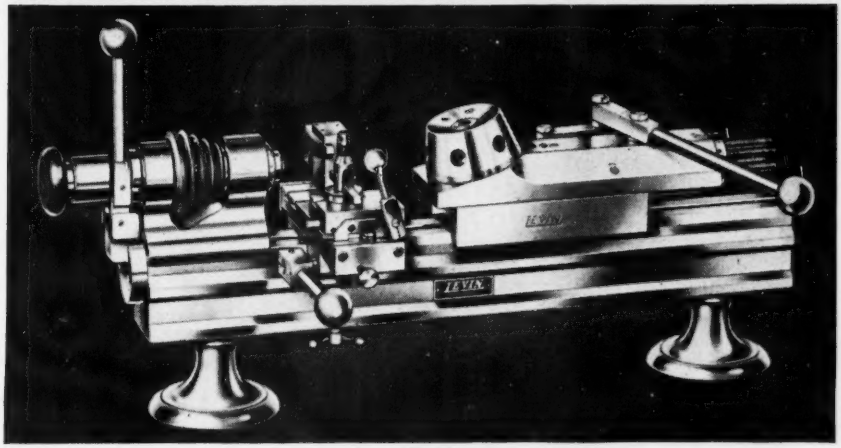
NEW HERMES, Inc. 13-19 University Place, N.Y. 3

In Canada: 359 St. James St., Montreal

World's Largest Manufacturer of Portable Engraving Machines

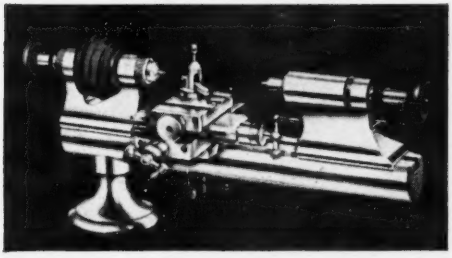
LEVIN® INTRODUCES A JEWELER'S TYPE

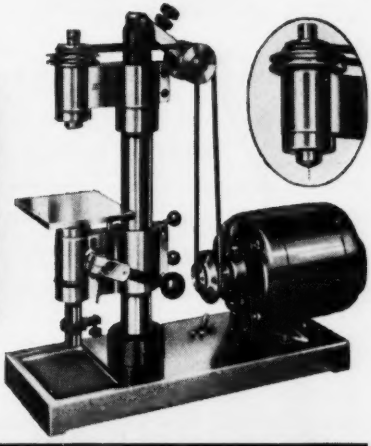
BENCH TURRET LATHE



A small sensitive turret lathe for instrument parts and second operation work. Swing 4", bed 18", collet capacity 3/16" or 5/16"; self indexing, 6 position turret with 1/2" holes and hardened slide ways.

Write for catalog listing turret lathes, turret tools and other models of lathes.





Micro-drill press for small hole drilling. Sensitive spindle holds small drills in TRUE collets ...Immediate Delivery!

LOUIS LEVIN & SON INC., 782 E. PICO BLVD., LOS ANGELES

Metal-Working News in Brief

Westinghouse Air Brake Co., Wilmerding, Pa., has announced the establishment of a research laboratory which will serve all divisions of the company, as well as its subsidiaries and affiliates. **Thomas Meloy,** president, Melpar, Inc., Alexandria, Va., has been appointed director of research of the organization.

The Huron Machine Products Company has announced the opening of a new plant and offices at 6252 Monroe Blvd., Dearborn, Michigan.

— o —

Clayton K. Baer has been appointed service engineer in the tool steel sales division of Crucible Steel Company of America, New York, N. Y. Mr. Baer will make his headquarters in Syracuse, New York.

— o —

At the quarterly board of directors' meeting **Harold F. Keyes, Jr.,** was elected assistant secretary of Brown & Sharpe Mfg. Co., Providence, Rhode Island.

— o —

T. J. O'Brien has been promoted to chief purchasing agent for Tamms Industries, Inc., Chicago, Ill., manufacturer of raw materials and package products in the paint and construction field.

— o —

Harry C. Martin, director of research and development, The Carborundum Co., Niagara Falls, N. Y., has been elected a vice president of the company.

BETTER SEEING TOOLS FOR INDUSTRY

FOSTORIA LOCALITES INCREASE WORKERS' EFFICIENCY

Light the Vital Seeing Zone on Machine Tools, Inspection and Assembly Benches



MODEL 3267-H-174

$6.12 EACH in pkg. of 6 Single Units $7.65 ea.

Overall length 32¾". Three instantly adjustable joints. Flat oblong base for machine screw mounting.

- **Rugged Construction** withstands vibration and rough handling
- **Instantly Adjustable** with flexible ball and socket joints
- **Baked Enamel Finish** — Exterior, Smooth Gray — Reflector Interior high temperature White
- **Reflector** accommodates 100 watt or any A-19 or A-21 medium screw base lamp
- **Wired Complete** with switch socket and 8 ft. oil resistant cord and moulded plug

WRITE FOR COMPLETE CATALOG of Localite models with various type reflectors, arms and bases for every industrial use.

LOCALITE fostoria for Light ON the Job

Reg U S Pat Off

THE FOSTORIA PRESSED STEEL CORPORATION FOSTORIA, OHIO

Localites are available through electrical wholesalers everywhere.

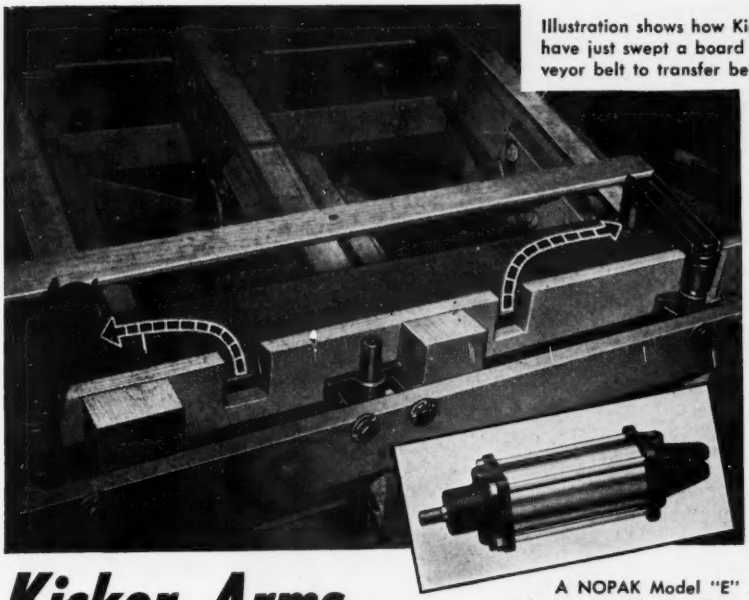


Illustration shows how Kicker Arms have just swept a board from conveyor belt to transfer belts.

A NOPAK Model "E" Air Cylinder is used in the installation pictured.

Kicker Arms... Powered by NOPAK Cylinders

. . . sweep boards from Conveyor to Transfer Belts

An important phase of the panel-gluing operation at Potlatch Forests, Inc., Lewiston, Idaho, is the transfer of boards coming from the glue applicator on a conveyor belt to the transfer belts which deliver them to the electronic gluer.

As each board hits the "bumper", a solenoid valve, controlled by a microswitch, actuates a NOPAK Model "E" Cylinder. The cylinder piston rod is coupled by bell-crank linkage to roller-tipped kicker arms which swing in a horizontal arc over the conveyor belt to sweep the board off the conveyor belt to the transfer belts which run at right angles to it.

This materials-handling operation is typical of many similar applications in which NOPAK Valves and Cylinders are used. For others see the NOPAK Application Manual.

GALLAND-HENNING MFG. CO., 2758 S. 31st St. • Milwaukee 46, Wis.

Refer to Sweet's File for Product Designers or write for Bulletin SW-1.

•

Representatives in Principal Cities

NOPAK

VALVES AND CYLINDERS

DESIGNED for AIR and HYDRAULIC SERVICE

A 7250-½-I-A

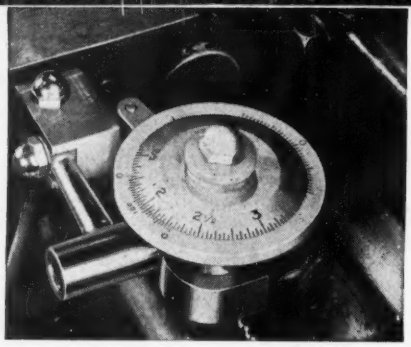
Book reviews

Industrial Instrument Training Course Outline. Published by Instrument Society of America, 1319 Allegheny Ave., Pittsburgh 33, Pa. 60 pages. Heavy paper covers. Price, 75 cents to ISA members; $1.50 to nonmembers.

A detailed outline for operation of an instrument mechanic training program, this publication includes data on the selection of mechanic personnel; instructor's suggestions; information on physical equipment; reference books and films; and a detailed presentation of training material according to subject. The material for this outline was collected and edited by 16 leading industrial instrument engineers and maintenance supervisors as members of the Instrument Society of America's Sub-Committee on Instrument Mechanic Training.

The booklet is designed to offer detailed programs covering fundamentals of mechanics and electricity, theory and practice in operation and maintenance of electrical, mechanical, pneumatic, hydraulic, and electronic instruments. Instruments for measuring and controlling such variables as temperature, pressure, flow, and level are covered. Automatic control instru-

YESTERDAY'S PIONEER . . . TODAY'S LEADER



WELDON . . .
MEASURING ATTACHMENT
for Lathes (Direct Reading) *Saves Time • Reduces Waste*

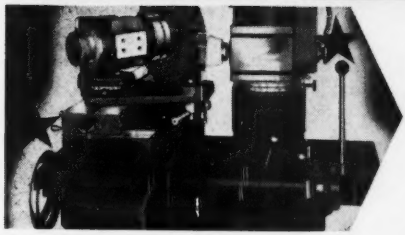
● This handy Weldon attachment measures directly the forward or reverse movement of the lathe carriage, within .001 of an inch. Easily attached to most lathes by drilling and tapping of one hole. ● Dependable, accurate, convenient—saves time and reduces work spoilage.

WRITE FOR CIRCULAR LA-1

Weldon distributors throughout U. S. A. and Canada carry complete stocks to serve you.

THE WELDON TOOL CO.
3000 WOODHILL ROAD • CLEVELAND 4, OHIO

RIGHT HAND OPERATION FROM FRONT *OR REAR!*





An Exclusive Feature with

COVEL No. 12 CUTTER AND TOOL GRINDER

Rear lever gives operator convenient *right hand* control. This feature, plus ball bearing table ways, reduces fatigue . . . saves time and effort . . . pleases operators. . . . increases output.

No. 12 sharpens all types of cutting tools. Readily adaptable to both internal and external grinding.

WRITE FOR BULLETIN MM-102

Builders of Precision Grinders for 78 Years

PROMPT DELIVERY FOR DEFENSE

COVEL PRECISION GRINDERS

BENTON HARBOR — MICHIGAN

DRILL GRINDERS — UNIVERSAL CUTTER & TOOL GRINDERS — HYDRAULIC & HAND FEED SURFACE GRINDERS

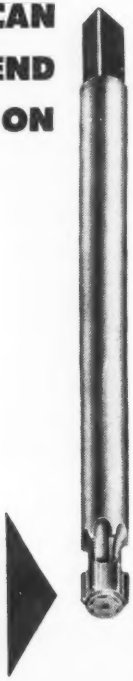
ments, valves, time cycle instruments, combustion control, and many other subjects are included in the outline.

Handy Tolerance Tables. By Alexander Michael, Sr. Published by Handy Length Book Co., 3507 17th St., S. W., Canton, Ohio. 144 pages. Heavy paper covers. Price, $2.00.

This pocket-size booklet of industrial tolerance tables in both decimal and fractional equivalents is designed to minimize figuring that consumes important job time. The format is such that ease of reading further speeds the process of determining the proper plus or minus tolerances. A localizer chart included with the booklet eliminates the possibility of error in reading by blocking all but the desired figures. The tables are especially adaptable to classroom and shop training programs where it is desirable to train workers or students in the use of decimal and fractional equivalents as they pertain to allowable tolerances.

The booklet itself is divided into two parts. The first part is made up of 14 tables devoted to standard industrial fractions and decimal equivalents to three places with tolerances from ± 0.01 to ± 0.25. The second part of the booklet contains 14 tables of machining tolerances to two decimal places and nearest fraction with difference to three places and tolerances from ± 0.01 to ± 0.25.

YOU CAN DEPEND ON



Staples QUALITY

IN CIRCULAR CARBIDE-TIPPED TOOLS

Here's the tool that gives greatest economy for all types of hand and power driven line reaming or accurate piloted reaming, the Staples Carbide-Tipped Shell Type Expansion Reamer. To compensate for wear, the reamer shell is expanded to original diameter by driving it up the tapered arbor. A new tool is obtained simply by replacing the worn shell.

Ask the shops that use them! They'll tell you that Staples Tools are the tools with the built-in bonus of greater accuracy and better performance . . . that they produce more work, with greater precision, and with minimum servicing. For maximum return on your tool investment, put Staples Tools to work in your production.

THE STAPLES TOOL COMPANY, Cincinnati 25, Ohio

Distributors in Major Cities

Staples CARBIDE-TIPPED CUTTING TOOLS

A complete line of Circular Carbide Tipped Cutting Tools
Expansion Reamers — Special Tools



SAVE UP TO 50% IN FINISHING TIME

On All Metals, Plastics, Wood, Glass, Hard Rubber, Pressed and Laminated Materials and Combinations

Reduce four operations: BURRING, FINISHING, CLEANING, POLISHING—to ONE, with rubber-cushioned BRIGHTBOY! Take advantage of this original, perfectly balanced combination of *abrasive and rubber* for *all* that each of these two finishing materials is worth!



WHEELS, STICKS, RODS, BLOCKS in three textures for machine and manual operations

Working together, the abrasive and rubber in Brightboy produce a "cushioned" light grind. *plus* smoothing, cleaning and polishing *in one operation!* Brightboy does many things other abrasives cannot do—gives you almost unbelievable finishing range, versatility, time-savings.

Ask your dealer for the Brightboy methods and applications Catalog-Manual and for *free introductory sample card*. Write us if he cannot supply you—or on any problem where finishing is involved.

HOW BRIGHTBOY SAVES PRODUCTION TIME

Use it for countless jobs regular abrasives cannot do—PLUS low cost, "every-day" finishing. Bridge the gap between the rough grind and the buff *in one operation!* Work to close tolerances. Shape to contour. Obtain a wide variety of conventional and special finishes and patterns—damask-eening, for example; often the "final" polish. No before-use preparation or dressing needed. No skilled labor necessary.

GENERAL USES—*A FEW OF MANY*:

Remove light digs, tool and heat marks. Clean welded and soldered joints. Finish dies and molds. Burr stampings, castings, machined parts. Maintain tools, equipment, machinery, parts.

Everybody's talking about Brightboy
The Abrasive-and-Rubber Revelation for Finishing!

DOING DEFENSE WORK — OR MAKING CIVILIAN GOODS? *Discover — profit from — Brightboy's outstanding adaptability!* Proved in production of countless civilian-goods items. *Proved again* in defense production: Ordnance, Instruments, Airplane parts, Internal combustion and jet engines, Electrical, Electronic, Transportation and Communication equipment. We will tell YOU how to save—profit—in your finishing. Contact your regular supply dealer or write us.

WELDON ROBERTS
Brightboy
RUBBER CUSHIONED ABRASIVES

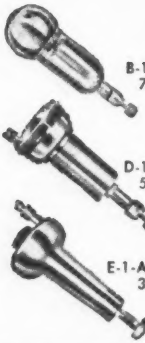
BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
6th Ave. & No. 13th Street Newark 7, N. J.
America's Pioneer Manufacturer of Rubber-Bonded Abrasives

Lead in Modern Industry. Published by Lead Industries Association, 420 Lexington Ave., New York 17, N. Y. 230 pages. Illustrated. Cloth binding. Price, $1.50 postpaid.

Devoted exclusively to the manufacture, applications, and properties of lead, lead alloys, and lead compounds, this book was written to provide the public in general with a broad picture of the whole lead industry and, at the same time, to serve as a handy reference source for those who are already using lead and its products. It is sufficiently technical to be of practical value to the engineer in industry and yet broad enough for those with a more casual interest in the use of lead and its products.

The book is divided into 28 chapters beginning with the history of lead, its production from mine to refined metal, and a detailed description of the various techniques for fabricating the metal into useful form. Separate chapters are devoted to the more important uses for lead, including storage batteries, cable sheathing, chemical construction, plumbing, architecture, radiation protection, coatings, solders, bearing metals, ammunition, and a host of other applications. The corrosion resistance of lead and its alloys and methods of using them for chemical construction are fully detailed along with the techniques for joining lead by soldering or welding (burning). Some of the more complex opera-





ARE YOUR *Best Bet!*

Finish grind dies, castings and similar work at correct high speeds and with ample power. Higher speeds permit the use of small diameter abrasive wheels. Save time and cut your costs. Onsrud Grinders operate in any position. Air keeps bearings and grinder cool. There are no commutator segments or brushes to wear. Choice of three precision built models. Light in weight... balanced spindles give vibration-free performance. Write for Grinder Bulletin 1129.

ONSRUD MACHINE WORKS, INC.
3924 PALMER STREET • CHICAGO 47, ILLINOIS

Correct MISALIGNMENT
with the ERICKSON FULL FLOATING HOLDER



MODEL 189
COLLET TYPE
(illustrated)
gives both
PARALLEL ADJUSTMENT
and ANGULAR ADJUSTMENT

With the Full Floating Holder, another of the Erickson family of Precision Holding Tools, work and cutting tools may be quickly and easily adjusted to offset machine errors.

This Precision Holder compensates for *both* parallel and angular misalignment with the work spindle through the use of mechanical principles never before utilized in any floating holder.

Designed for floating reamers, taps, die-heads and all other chuck-held cutting tools, the versatile Erickson Full Floating Holder will help you increase production, reduce scrap, and lower tooling costs.

Available in Taper, Bushing and Erickson Collet Types

Write for Catalog Today

Catalog A: *Precision Collet Chucks*

Catalog B: *Adjustable and Full Floating Holders*

Catalog C: *Precision Tap Chucks*

Catalog D: *Speed Chucks and Air Operated Cylinders*

Catalog E: *Precision Expanding Mandrels*

Catalog F: *Speed Indexers*

Catalog G: *Boring and Reaming Tools*



ERICKSON TOOLS
DIVISION OF THE ERICKSON STEEL COMPANY
2303Q HAMILTON AVENUE **CLEVELAND 14, OHIO**

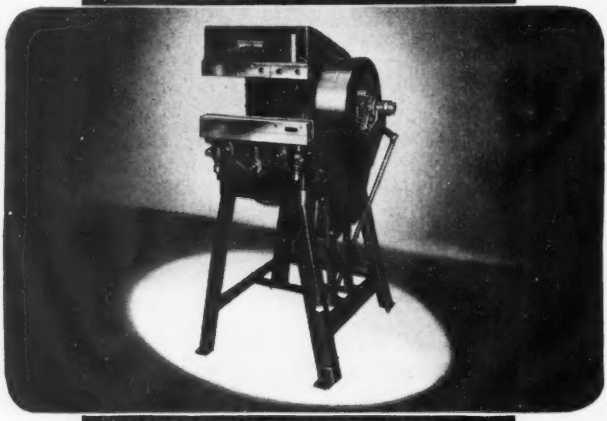
tions are illustrated with both drawings and photographs.

The balance of the book is devoted to the manufacture, applications, and properties of industrial lead compounds, including white lead, litharge, red lead, tetraethyl lead, and others. White lead paints and metal protective paints are covered in detail with actual formulations given for a variety of specific applications. Rounding out the book are the latest specifications for lead, lead alloys, and lead products, as well as the properties of lead and lead alloys and the physical constants of organic and inorganic lead compounds.

Proceedings of the Eighth Annual Meeting of the Metal Powder Association. Published by Metal Powder Association, 420 Lexington Ave., New York 17, N. Y. 97 pages. Price, $2.50.

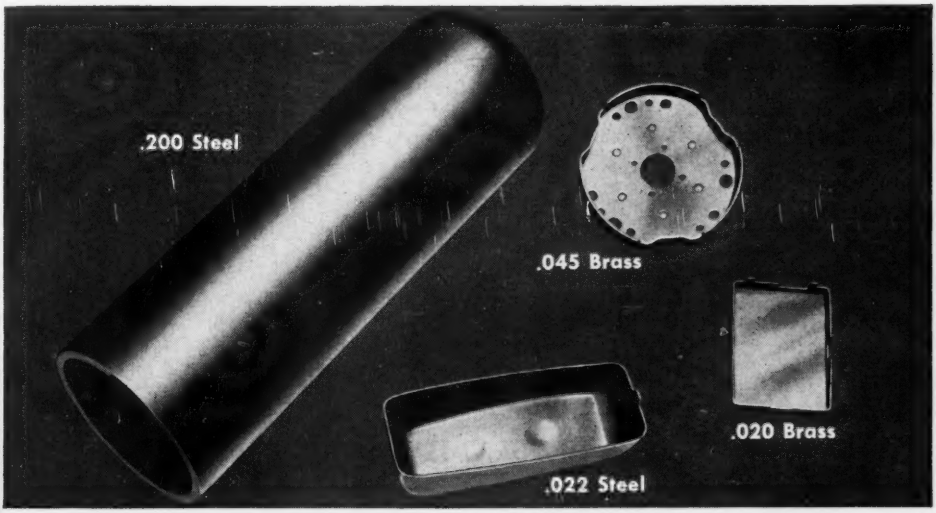
The booklet contains all papers, illustrations, and discussions presented at the eighth annual meeting of the Metal Powder Association which was held in Chicago on April 29 and 30, 1952. Papers published in the proceedings include: "Recent Practical Applications of Hot Pressing," by Jerome F. Kuzmick, consultant and president, Welded Carbide Tool Co., Clifton, N. J.; "Powder Metallurgy in the Manufacture of Clocks and Mechanisms," by Fred Lux, president, Lux Clock Mfg. Co., Inc., Waterbury, Conn.; "Aspects of Powder Met-

WHITNEY METAL
TOOL COMPANY
39 YEARS EXPERIENCE



WHITNEY-JENSEN
No. 247 PRESS BRAKE
Production shops turning out quantities of small formings in large presses and job shops requiring a small brake, will find the No. 247 a cost reducing, space-saving piece of equipment. Capacity of the machine is 14 ga. mild steel over 7/8" 90° V die or 4½ tons.
Strokes per minute — 47
Throat height — 11-1/2"
Throat depth — 6-1/4"
WHITNEY METAL TOOL COMPANY
110 FORBES STREET, ROCKFORD, ILLINOIS

A BREHM DIE
NEVER BECOMES OBSOLETE!



Reduces Original Cost . . . Cuts Operating Costs!

When model or part changes interrupt production, only the cutting adapters of a Brehm Die need to be replaced to continue full production. Don't overlook the fact that a single Brehm Die, using various cutting adapters, greatly reduces the original investment, to say nothing of reducing current operating costs.

The Brehm "Shimmy" Die has angular cams which cause the shearing edges to cut four ways in a single press stroke. Higher production and lower costs are possible because "pinch" and slow, costly "horn" trimming operations are eliminated. Materials, thicknesses, shapes and sizes can vary. Such as gold, silver, plastic, rubber, aluminum, copper, brass, zinc, stainless or mild steel. A refrigerator door, the case of a lady's watch, an artillery case, a business machine, aircraft or automotive part.

Perfect edges, clean, without burrs or distortion at the trimmed edge. Contours can be straight or curved, with single or multiple notches and projections.

For a free Brehm Die Catalog, write today. If you wish, and without obligation, send us your blueprint or the part for complete information or quotation.

Brehm TRIMMING DIES — THE "SHIMMY" REG. DIE ®

THE STEEL PRODUCTS ENGINEERING CO.

BREHM DIE DIV., DEPT. O, SPRINGFIELD, OHIO

allurgy in National Defense," by John D. Dale, captain, Ordnance Corps, Frankford Arsenal, Philadelphia, Pa.; "Powder Metallurgy for High Temperature Applications," by Julius J. Harwood, deputy head, Metallurgy Branch Office of Naval Research; "Carbides—Machining and Ordnance Applications," by Malcolm F. Judkins, chief engineer, High Temperature Alloys Division, Firth Sterling Steel & Carbide Corp., Pittsburgh, Pa.; "Characteristics of Carbonyl Iron Powders for the Electronic Core Industry," by George O. Altmann, physicist, General Aniline & Film Corp., Grasselli, N. J.; "Characteristics of Hydrogen Reduced Iron Powders for the Electronic Core Industry," by R. H. Rodrian, Metallurgical & Electronic Division, C. K. Williams & Co., East St. Louis, Ill.; "Characteristics of Electrolytic Iron Powders for the Electronic Core Industry," by W. M. Shafer, Plastic Metals Division, National Radiator Co., Johnstown, Pa.; "Magnetic Powder Cores for Military Communication Equipment," by Eberhard Both, Signal Corps Engineering Laboratories, Fort Monmouth, N. J.; "Progress in Powder Metallurgy in Europe," by W. D. Jones, consultant and director, Powder Metallurgy, Ltd., London, England; and "Air-Power — A Must in National Security," by Russel E. Settle, director of general supply. Allison Division, General Motors Corporation.



"M-40-U"
ALLOY CENTERS

Give You PRODUCTION-PROVEN
"DEEP CORE DESIGN"

Get more for your center dollar with Gorham "DEEP CORE DESIGN!" "M-40-U" Alloy Centers are PRODUCTION-PROVEN in the largest plants. They consistently outlast high-speed and other alloy centers, stand far more abuse. Although equal to carbide in wear resistance, they cost less, are easier to redress.

And Gorham's exclusive "DEEP CORE DESIGN" allows many more redressings, too! A core of "M-40-U" Alloy, developed by Gorham expressly for wear, abrasion and heat resistance, is induction brazed deep in the shank, after which the entire center is finish ground, giving you wear material permanently supported by tough shank steel!

Gorham "M-40-U" Alloy Centers are available with Morse, B. & S. or Jarno taper shanks. Immediate delivery on popular sizes, "specials" to specification. Free literature gives description, dimensions, prices. Send for your copy today.



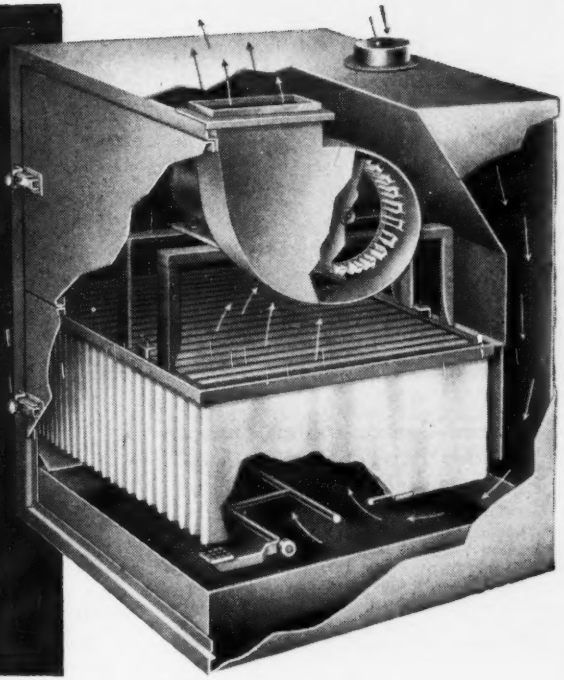
"DEEP CORE DESIGN"

Gorham TOOL COMPANY

"EVERYTHING IN STANDARD AND SPECIAL CUTTING TOOLS"

14414 WOODROW WILSON • DETROIT 3, MICHIGAN
WEST COAST WAREHOUSE: 576 North Prairie Ave., Hawthorne, Calif.

IT'S LIKE MONEY IN THE BANK



The dusts from industrial grinding operations can be valuable. This is particularly true of dusts from diamond-impregnated wheels, which today have a real cash value.

Torit Dust Collectors are ideal for capturing and saving dusts from grinding operations. As diagrammed above, air moves from the *outside to the inside* of the filters. These, in turn, are made of a specially hard-surfaced and tightly woven material. No dusts become enmeshed. A few strokes of the foot pedal shakes all dust into the storage tray.

This salvage of valuable dusts is a bonus, for Torit Dust Collectors have long proved their ability to pay for themselves through economical operation and superior efficiency. For complete details and the latest Torit catalog, write:

TORIT **Manufacturing Co.**

296 Walnut Street St. Paul 2, Minn.

new shop equipment

Gas-Fired Carbonitriding Furnace Includes Replaceable Vertical Radiant Tube

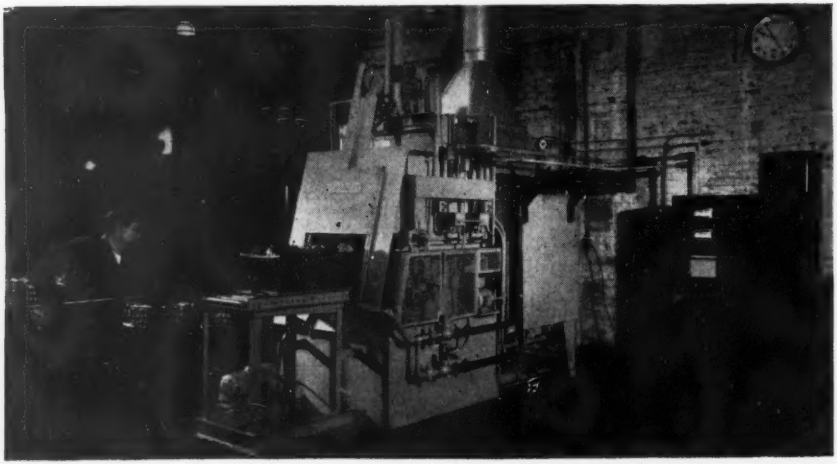
Lindberg Engineering Co., 2469 W. Hubbard St., Chicago 12, Ill., has added a gas-fired vertical radiant tube unit to its line of carbonitriding furnaces. The lightweight vertical radiant tubes can be removed and replaced in a matter of minutes, it is claimed, thus eliminating production down time while the furnace cools.

The furnace is rated 250 net pounds per hour for hardening or flash case, dry cyaniding. It is a completely packaged unit with built-in quench system and automatic cycle control. The Lindberg "Hyen" Endothermic Atmosphere Generator used with the furnace is adjustable to produce different atmospheres not only for carbonitriding but also for carburizing, annealing, and bright hardening.

48-Inch Rotary Table for Radial and Boring Mill Applications

As an addition to its line of 12, 24, and 36-inch "Rotab" power-operated rotary tables, Machine Products Corp., 6773 E.

Lindberg Gas-Fired Vertical Radiant Tube Carbonitriding Furnace in use





"Rotab" 48-Inch Motor-Driven Rotary Table

McNichols Rd., Detroit 12, Mich., has announced a unit with a 48-inch diameter faceplate designed to meet the need for handling radial, jet, and turbo engine parts. The unit can be used for holding work during machining or checking radial or angular operations, and is said to be especially well adapted for radial and boring mill applications.

A motor located directly under the table and connected to it by direct drive with push-button control rotates the faceplate at 5 r.p.m. (or to specifications), simplifying the setting up of work. A handwheel is used to complete the setting to accuracy within two minutes by vernier graduations provided on a scale under the table. The faceplate can be rotated to any degree and can be adjusted to any angle from the vertical to the horizontal position or to 30 degrees below the horizontal the opposite way. It can be locked in any position. The surface of the plate is divided by eight T-slots $\frac{1}{8}$ inch wide extending to the outer rim to provide clamping facilities.

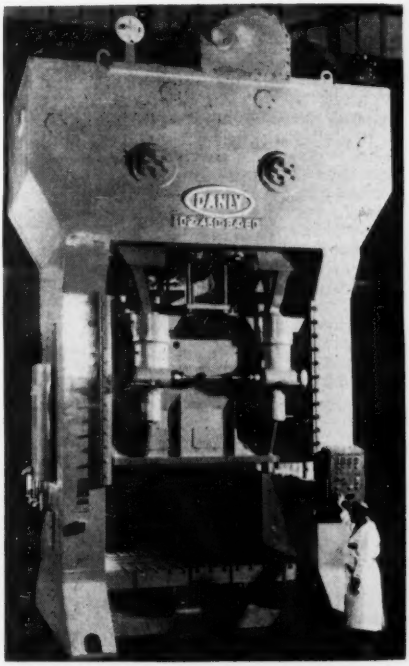
The Rotab is equipped with a centering plug and a 10-inch sine bar. Marking rings are scribed in the faceplate to facilitate setting-up operations. The overall height to the top of the faceplate in a horizontal position is 35 inches. The distance from the base to the center line of the faceplate in the vertical position is 26 inches.

450-Ton Double-Action Press Has Fast Overall Stroke Speed

Danly Machine Specialties, Inc., 2100 S. Laramie Ave., Chicago 50, Ill., has announced a 450-ton double-action straight-side press which is equipped with a Dynamatic clutch that varies the linear stroking speed during the press cycle. Waste motion is said to be reduced to a minimum in the cycle so that the press can be operated at the comparatively fast rate of 14 strokes per minute. The overall stroking rate is accomplished by accelerating the part of the cycle not actually involved in the drawing work. Slide speed during the effective draw is held to a slow speed of 60¼ feet per minute.

Motor adjustments to both the inner and outer slides are provided. In addition, the outer slide, or blankholder, has a provision for a ¼-inch pinch adjustment which can be made at each corner of the blankholder. Another feature of the press is the central lubrication system which consists of an oil pump and filter unit that

Danly 450-Ton Double-Action Straight-Side Press



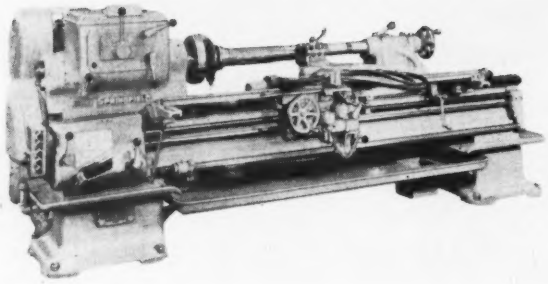


Illustration showing Springfield Hydraulic Contouring Attachment mounted on Springfield lathe

distributes clean, circulating oil to all working members of the drive. Oil is piped under pressure to the bearings of the flywheel and driveshaft, which are antifriction, as well as to gear teeth. The specially engineered bed of the press is said to meet prescribed limits of deflection and at the same time is shallow enough to permit installation without a pit.

Contouring Attachment Is Designed for Use on Springfield Lathes

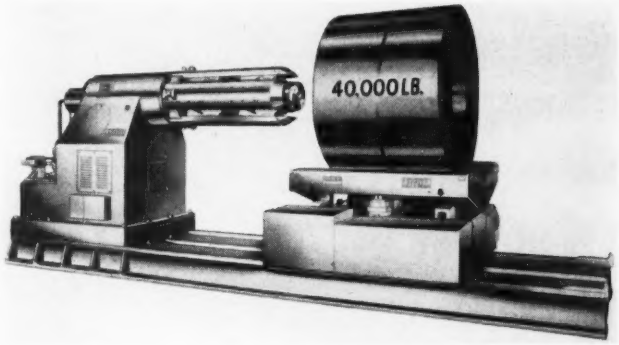
Manufactured by The Springfield Machine Tool Co., Springfield, Ohio, and distributed by Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago 6, Ill., a hydraulic contouring attachment with maximum sensitivity and accuracy has been developed for use on Springfield lathes when performing turning, boring, and facing operations on shafts, axles, rotors, and other parts with varying diameters, shoulders, tapers, radii, and flanges.

According to the manufacturer, there are no complicated mechanisms or fragile units in the attachment to cause trouble. A motor-driven hydraulic pump, relief valve, and oil reservoir are combined into a single self-contained power unit which supplies hydraulic pressure to the servovalve and fully universal hydraulic compound rest. A supported and guided adjustable template holder places templates at the front of the lathe where they are convenient and in full view of the operator. The attachment incorporates an electromechanical constant cutting speed control which governs a variable drive and maintains constant cutting speed as the lathe tool follows a varying contour.

Other features of the contouring attachment are hydraulic movement which provides for a fine finish and eliminates unusually long hydraulic lines; opposed hydraulic pressures in the hydraulic cylinder which hold the slide securely for heavy-duty cutting; and a turret tool post which permits a wide variety of tooling arrangements.

Automatic Centering Reel Is Offered in 5, 10, and 20-Ton Capacities

An extra heavy duty automatic centering reel is now being produced in 5, 10, and 20-ton capacities by F. J. Littell Machine Co., 4163 Ravenswood Ave., Chicago 13, Ill. The reel has hydraulically expanded arms which are contracted and ex-

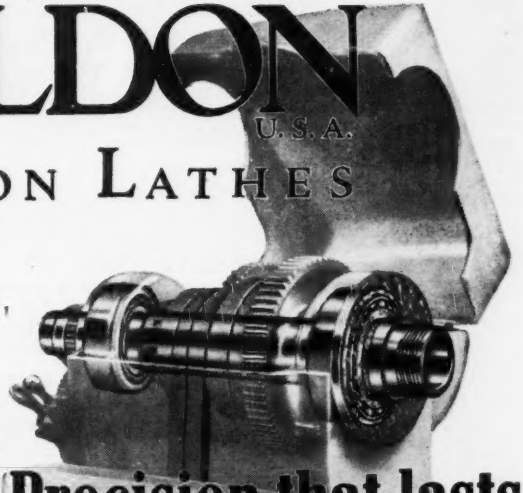


Littell Extra Heavy Duty Automatic Centering Reel

SHELDON

CHICAGO U.S.A.

PRECISION LATHES



Precision that lasts

. . . "ZERO PRECISION" TIMKEN TAPER ROLLER BEARINGS

No lathe can be more accurate than its spindle bearings. Hence before buying any lathe one should check the *exact* type and tolerances of bearings used.

The No. TS-56B (and several other) SHELDON Precision Lathes have Timken "Zero Precision" Taper Roller Bearings, held to tolerances of .00015". Not only are these the most accurate bearings used in any lathe, they are the sturdiest type . . . hold their accuracy thru long hard use . . . hold it even under abuse. With the other stamina features built into SHELDON Precision Lathes, they assure continued accuracy, without costly maintenance, thru years of hard service.

SHELDON "Stamina" Features:

- Rigid, Heavily cross-strutted 1-piece Beds—2 V-ways, 2 Flat ways
- Full Double-Walled Aprons—all gear shafts supported on both ends.
- Heavy Carriage with wide bearing on bed.
- Twin V-Belts to Spindle for extra power.



Write for Catalog

SHELDON MACHINE CO., INC.

4250 N. Knox Ave., Chicago 41, Illinois

panded by means of hydraulically actuated cams within the spindle. As the spindle sleeve is hydraulically pushed forward, the arms contract to the minimum diameter. As the sleeve is pulled toward the frame, the arms spread until the coil is gripped tightly. The cams on the sleeve and on the arms are mechanically interlocked to hold arms in position, both expanded and contracted. The simultaneous expansion of the arms centers the coil.

The V-type coil-loading car rides on a track base. The track can be extended from machine to coil storage area so that material can be conveyed to the reel without intermediate handling.

Flat Stock for Punches and Dies

Designated as the No. 497, a precision-ground die and flat stock made to a special analysis for hardening in air and containing 5 per cent chromium for wear resistance has been announced by The L. S. Starrett Co., Athol, Mass. The stock is recommended for punches and dies used in long production runs or for stamping silicon, stainless steel, Monel, and abrasive material. According to the manufacturer, the air-hardening die stock maintains accuracy of dimension throughout the heat treatment process, and grinding to final size is minimized. The stock has a hardening range of from 1,700 to 1,800 deg. Fahrenheit.

The Starrett No. 497 Air-Hardening Flat Stock is fully spheroidized annealed for easy machining and is cut lengthwise from the sheet and ground to within 0.001 inch in thickness with a fine finish of 25 to 35 micro-inches for accurate layout work. Ends are machined square; edges are ground parallel and square. The stock is supplied ready to lay out and cut out and is available in a complete range of sizes.

MARKING TOOLS TO GIVE YOUR PRODUCT

The Mark of QUALITY!



TYPE HOLDERS AND STEEL TYPE

Parker precision press and hand marking type holders are engineered for quick, accurate interchangeability of type. This is furnished in all standard character sizes from 3/64" to 1/4" or in special type and symbols to your specifications.



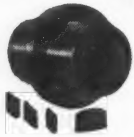
MARKING DIE FOR AZIMUTH SCALE

Sharp, clean, raised 1° increments and a double row of perfect figures, from 10 to 170 in this semi-circular azimuth scale all hardened into a solid tool steel block. Parker dies cost less because they perform perfectly—longer.



STANDARD OR SPECIAL STAMPS

Parker steel trade mark, identification, part number or inspection stamps are made in dozens of standard shapes and designs. Special stamps in any quantity, any size to mark any material are also manufactured to your specifications.



REMOVABLE INSERT MARKING DIES

This removable segment die is used for stamping and codeing military shell cases. Here one die replaces three used previously and eliminates two stamping operations, thereby decreasing marking cost by over 60%. Another application of Parker experience and craftsmanship.

SEND FOR THE PARKER BLUE BOOK TODAY

INVESTIGATE THE FLEXIBILITY OF PARKER'S FACILITIES TODAY!



THE PARKER STAMP WORKS, INC.

MARKING DIE • MACHINERY DIE

FRANKLIN AVENUE • HARTFORD, CONNECTICUT

by Parker

Now! S-T-R-E-T-C-H your Tapping Capacity!

with PROCUNIER Tapping Heads

Month after month of steady, rigorous high speed production tapping is taken in stride with versatile Procunier Tappers. Built to rigid standards of accuracy and dependability, they provide *longer hours* of efficient tapping, with *fewer* costly shutdowns, *less* parts spoilage and a big reduction in tap breakage. These combined advantages enable operators to increase their capacity to handle bigger production jobs with greater ease, accuracy and speed. Only Procunier tapping attachments offer faster, smoother action, longer life, less wear and vibration with a minimum of maintenance.



Check these Procunier Advantages:

1. **Tap breakage is practically eliminated due to the high sensitivity of the new cork-faced friction clutch which automatically regulates the driving pressure.**
2. **Strain and wear are minimized and tortion eliminated through special gear reversing mechanism which distributes pull evenly.**
3. **Tap wobble is eliminated because chuck spindle is supported at both ends.**
4. **Aluminum housing assures greater strength with minimum weight—a vital factor for high speed tapping. *PLUS MANY OTHER EXCLUSIVE FEATURES.***

New TRU-GRIP Tap Holder

The exclusive Procunier "Tru-Grip" tap holder is lighter, smaller in diameter. It affords easier tapping close to walls or shoulders, eliminates "chewed" tap shanks. Holds tap true.

WRITE TODAY for more complete details and specifications on the complete line of Procunier Tapping Heads and see why Procunier offers the "finest in tapping equipment."

PROCUNIER SAFETY CHUCK CO.
12 S. Clinton St., Chicago 6, Ill. Dept. 10

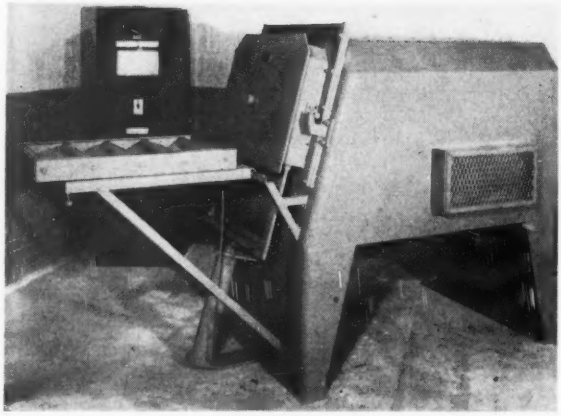
Gentlemen: Please send your illustrated brochure giving complete details, specifications and prices on the improved line of Procunier High Speed Tapping Heads.

Name .....
Address .....
City..... Zone... State.....

Procunier

Safety Chuck Company

12 S. CLINTON ST. CHICAGO 6, ILL.



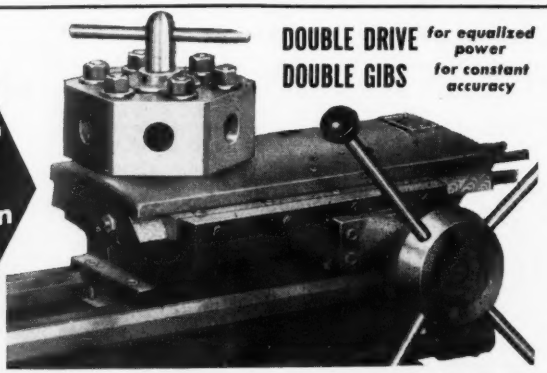
Ipsen D-300 Tempering Unit

Tempering Unit Designed for Bright Tempering and Controlled Oxidation

Designated as the Ipsen D-300, a tempering unit which is said to make possible both bright, scale-free tempering and controlled-oxidation tempering from 400 to 1,400 deg. F. has been announced by Ipsen Industries, Inc., 721 S. Main St., Rockford, Ill. The unit is an automatic, sealed furnace designed for use with a controlled atmosphere; however, it can also be used as a conventional tempering unit. The unit has a welded, gas-tight frame and a flat, ground door frame and plate designed to minimize leakage.

For bright tempering operations, the unit is supplied with a protective atmosphere during the entire cycle. After sufficient time at temperature, the load is cooled in the furnace to approximately 400 deg. F., thus making it cool enough to be removed without danger of oxidation.

Enco
Self-Indexing
HEXTURRET
For Lower Production Costs and Speedier Output



DOUBLE DRIVE for equalized power
DOUBLE GIBS for constant accuracy

- Custom built to fit all lathes from 9" to 18".
- Smooth, sensitive control with Pilot wheel drive through twin gears and racks.
- All bearing surfaces hand scraped.
- All parts of indexing mechanism hardened, assuring accuracy.

SEND FOR CATALOG No. 50A

Also manufacturers of Enco Turret Tool Posts for all Lathes, and "MITI-MITE" Magnetic Base Tools.



Close tolerance shoulder-screw job held to plus .002; minus .000.

ENCO Manufacturing Co., Dept. 1102
4524 W. FULLERTON AVE., CHICAGO 39, ILL.
Reasonable Deliveries

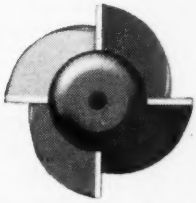
AN IMPROVED STANDARD COUNTERBORE DESIGN by ECLIPSE

NEW!

FLUTE DEVELOPMENT GIVES YOU

- ★ *Deep* counterboring with a *wider range* of pilot sizes.
- ★ A higher helix angle which assures *faster chip disposal.*
- ★ New tooth construction thus providing maximum *heat dissipation.*

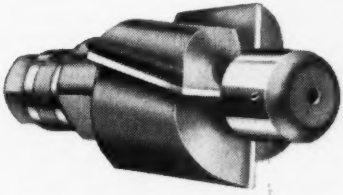
The DIFFERENCE at a glance!



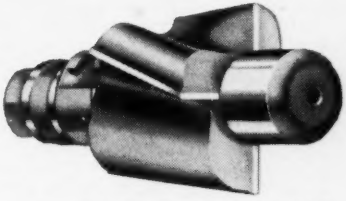
End view of counterbore showing conventional flute form, designed for spot facing and *shallow* counterboring.



New style flute form designed for spot facing and deep counterboring; chips can flow freely from pilot diameter.



Side view of counterbore showing conventional flute design which provides ample chip clearance for shallow counterboring and spot facing.



New style flute form with increased helix angle permitting faster chip removal, thus reducing heat to a minimum in deep counterboring.

Our present stock is being replaced with the new design as rapidly as possible so that in the very near future all orders will be filled with this later design within the range of sizes provided.

ECLIPSE COUNTERBORE CO.

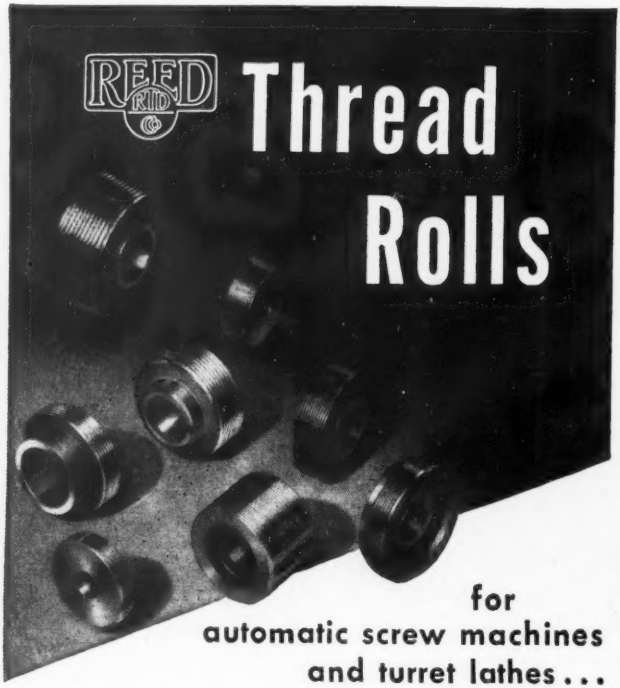
Founded in 1913

DETROIT 20, MICHIGAN

According to the manufacturer, the work finish remains clean, bright, and scale-free—ready for immediate plating or painting.

The unit is also said to produce a controlled oxide coating which is often desired to minimize corrosion or wear and to produce an attractive blue-gray or blue-black finish. This operation may be accomplished either separately or concurrently with a tempering or annealing operation, as the protective atmosphere maintains a bright surface during any necessary tempering or annealing operations prior to the controlled-oxidation cycle. To produce a controlled oxide coating, the flow of protective gas is discontinued and a predetermined quality of water is introduced into the unit for a specified period after the load heats or cools to the oxidation temperature. During either air or quench cooling, further oxidation is prevented by the controlled oxide coating. The air-cooling produces a blue-gray coating, while the oil quench forms a darker blue-black finish which is said to be considerably more resistant to corrosion. Either soluble oil or standard quenching oil may be used with the tempering unit.

Solution heat treating of aluminum, annealing of copper and brass, and precipitation or solution heat treating of beryllium copper can also be performed with the unit.



for
automatic screw machines
and turret lathes . . .
— produce uniform accurate threads economically.

REED ROLLED THREAD DIE CO.

Manufacturers of
THREAD ROLLING MACHINES and DIES • KNURLS • THREAD ROLLS
Worcester, Massachusetts, U. S. A.

D 252

Lubricant for Cold Chamber Die Casting Machine

Known as "Plunger Slick," a high temperature lubricant for cold chamber die casting machines has been announced by G. W. Smith & Sons, Inc., 5407 Kemp Rd., Dayton 3, Ohio. The lubricant is said to plate plungers and cylinder walls with an adherent lubricating coating that will not run off at high temperatures, thus protecting against the corrosive action of molten aluminum.

According to the manufacturer, the lubricant is clean and will not stain. Plunger Slick is available in one and five-gallon pails and in 55 gallon drums.

TUMICO



Series T

The final authority on precision work

When work is checked out with one of these Series "T" Tubular Micrometers, you *know* it's right. The advanced tubular design makes the micrometer lighter, so there's less chance that its weight will influence the reading. And the vacuum sealed into the tubular frame permits the instrument to absorb heat without significant expansion or contraction.

Tumico's new Silver Mist Chrome surface helps insure absolute precision, too, by reflecting much of the heat that is absorbed by black surfaces on ordinary micrometers.

These "Feather Touch" micrometers retain absolute accuracy indefinitely. Engineered tubular design is less susceptible to shock — two-point wear take-up maintains the original precision.

For final, authoritative checking in plant or laboratory, you can't beat Tumico's Series "T" Micrometers — available now in capacities from 0" to 30", plain or carbide tipped anvils and spindles.

TUBULAR MICROMETER CO.

ST. JAMES, MINNESOTA

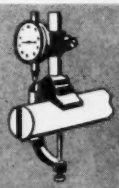
FEATHER TOUCH

SEATTLE • LOS ANGELES • DENVER • DALLAS • CHICAGO • MINNEAPOLIS • KANSAS CITY
DETROIT • ATLANTA • NEW YORK • TORONTO, CANADA • EXPORT OFFICE: CHICAGO

FOR EVERY JOB

TUMICO

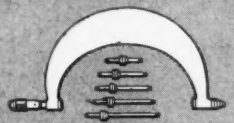
PRECISION MEASURING INSTRUMENTS



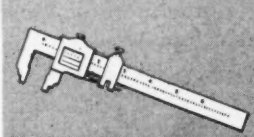
TUMICO POST GAGES
Precision micrometer or dial indicator instruments adaptable to a wide variety of uses. 10 models.



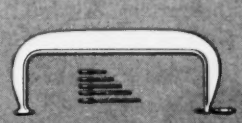
TUMICO MICROMETER SETS
Complete sets for a broad range of accurate measurement operations. From 0" to 30" in 1" steps.



TUMICO OVER-THE-BAR MICROMETERS
Precision bore measurement without removing boring bar. 11 models from 3" to 28".



TUMICO VERNIER CALIPERS
Precision made. Accurate, clearly etched graduations and numerals. 24 models from 6" to 48".



TUMICO BAR MICROMETERS
Provide a wide range of precision measurement with low investment. 30 models from 6" to 168".

Aluminum Alloy Takes Brilliant Finish

Known as Alcoa C57S, an aluminum alloy which is said to take an unusually brilliant Alumilite finish has been announced by Aluminum Company of America, 1950F Gulf Bldg., Pittsburgh 19, Pa. According to the manufacturer, the alloy, which is ideal for trim purposes, approaches high-purity aluminum in the transparency, metallic luster, and sheen of its finish, while affording unusually high mechanical properties. In addition to taking a brilliant finish, Alcoa C57S offers the added attraction of colored Alumilite finishes in many shades.

Instrument Combines Temperature-Indicating Pyrometer and Millivoltmeter

Thermo Electric Mfg. Co., 488 Huff St., Dubuque, Iowa, has announced the addition of a combination temperature-indicating pyrometer and millivoltmeter to its line of "Temco" electrical equipment. Designed for easy portability to the job, the unit features long thermocouple leads which permit temperature checkings up to 8 feet from the instrument. The pyrometer scale is 3¾ inches long and mirrored for accurate and easy reading.

The instrument is available in three scale ranges, all calibrated in Fahrenheit, Centigrade, and millivolts, as follows: 800 deg. F., 430 deg. C., and 17 mv; 1,600 deg. F., 865 deg. C., and 36 mv; and 2,250 deg. F., 1,225 deg. C., and 50 mv. Automatic compensation for internal resistance changes due to variation in ambient temperature is provided.



"Temco" Portable Temperature-Indicating Pyrometer and Millivoltmeter Unit

The instrument is housed in a sturdy, attractively finished carrying case with a removable hinged cover.

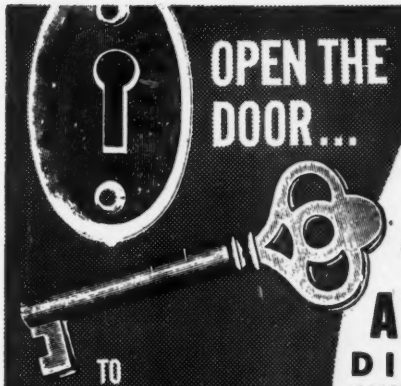
7 important advantages with MOTCH & MERRYWEATHER HEAVY DUTY ANTI-WELD SOLUBLE OIL



Triple-Chip deters welding and pick-up; prevents rust. Consequently, tool life is lengthened and accurate, milled-finish work is produced. Tool maintenance and replacement is reduced. Furthermore, Triple-Chip is non-injurious to the skin, is smokeless and odorless.

Get a supply today from your local dealer.

THE MOTCH & MERRYWEATHER MACHINERY CO.
PENTON BUILDING CLEVELAND 13, OHIO
COMMAND OUR UNPARALLELED EXPERIENCE IN CIRCULAR SAWING . . .



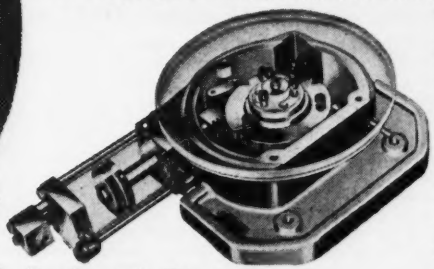
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LOWER COSTS

GREATER DEPENDABILITY



ALLEN AIR OPERATED

DIAL FEED TABLES

MODEL 11EA and 11EB
- Working Mechanism Completely Enclosed
- Rack and Gear Drive

Please Write for Illustrated Brochure.

- Clockwise or Counterclockwise Rotation
- Adjustable from 4 to 24 index
- Guaranteed Against "Override"
- All Working Parts Flame Hardened

THE A. K. ALLEN CO.

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57 MESEROLE AVE. • BROOKLYN 22, N. Y.

FOR EXPORT: States Trading Co., 401 Broadway, N. Y. Cable Address: STRADESO, N. Y.



Make SET-UPS THIS EASY WAY!

You'll have no more worries over the accuracy of your set-ups for tapping and reaming jobs if you make them with a Ziegler Floating Tool Holder. It's the easiest way of making set-ups—and also the most accurate way.

Instead of taking the extra time required to make a set-up of absolute accuracy, you can quickly align the work to within a 1/32" tolerance and leave it to the Ziegler Tool Holder to do the rest.

In leading industries throughout the nation, the Ziegler Holder has proven itself an economy far out of proportion to its small cost. Get one for your next tapping or reaming job.

Ziegler ROLLER DRIVE FLOATING HOLDER for Taps and Reamers...

W. M. ZIEGLER TOOL CO.

13566 AUBURN DETROIT 23, MICH.

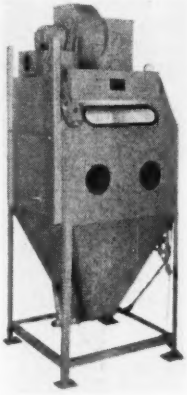
WRITE FOR CATALOG

Waterproof Sandpaper Developed for Wet Sanding

Behr-Manning Corp., Division of Norton, Co., Troy, N. Y., has announced the development of "Tufbak" Speed-wet Durite Paper which is said to permit freeness of cut while still maintaining the initial sharp "bite" necessary in wet sanding operations. According to the manufacturer, the paper features an unusually tough backing while still permitting maximum flexibility. Its increased body strength is said to resist creasing, cracking, and curling. Maximum durability, mileage, "hand," and resistance to skidding and peeling of grit are claimed to be provided by the paper whether the sheet is soaked in the usual liquids for a few minutes or for hours.

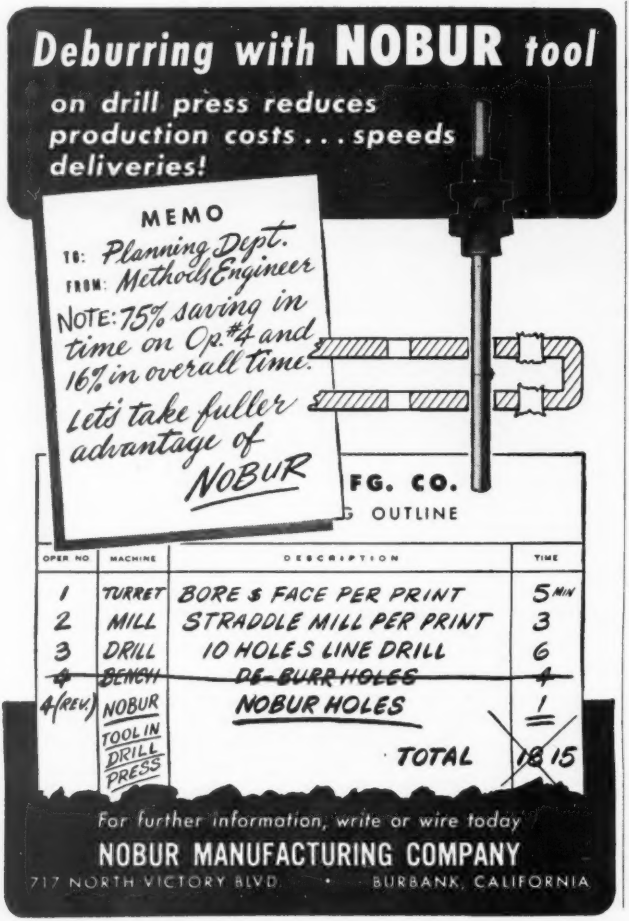
Abrasive Wet-Blast Machine Produces Finishes on Production Tools

An abrasive wet-blast machine for producing refined finishes on production tools is now being manufactured by Abrasive Wet-Blast, Inc., Niles, Ohio. Designed for easy operation, the machine utilizes special abrasives suspended in water which is applied by air pressure to the tools to be finished. Metal removal is said to be negligible, with close tolerances retained on accurately machined tooling.

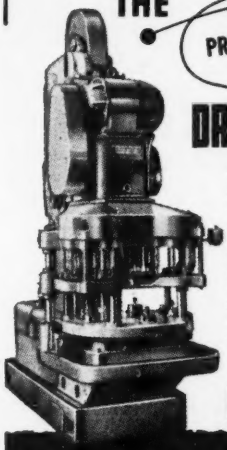


Abrasive Wet-Blast Machine

Form cutters, gear cutters, hobs, drawn dies, permanent die-cast molds, extrusion dies, taps, and other tools finished with the machine are claimed to possess an increased capillary attraction



THE PRECISIONEERED DRILLMASTER



The DRILLMASTER Vertical Hydraulic Drilling Machine is designed to meet the high precision standards of modern production. The DRILLMASTER drills, bores, reams, faces and taps. Many combined operations are possible when the DRILLMASTER is used with indexing table, multiple drilling heads and auxiliary units. Available in 5 models: 5 H.P., 7½ H.P., 10 H.P., 25 H.P., and 50 H.P.

Write today for the DRILLMASTER technical bulletin

STANDARD MACHINE & TOOL CO., LTD.
WINDSOR, ONTARIO

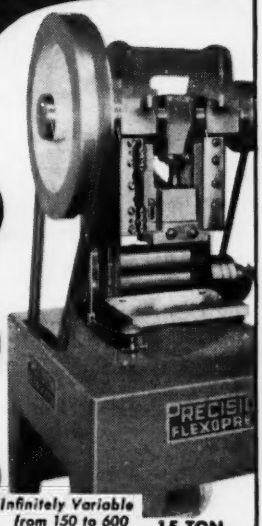
BRANCH OFFICE — LEASIDE, ONT.
U.S.A. Sales Representative Arnold F. Warner Co. New Center Bldg. Detroit 2, Mich.

FIRST

with BUILT-IN FEED ROLLS

with LIGHT ALLOY RAM

with BALL BEARING RAM-WAYS



Infinitely Variable from 150 to 600 RPM

15 TON

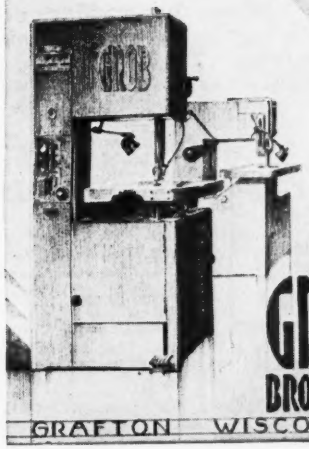
FOR QUALITY CONTROLLED STAMPINGS

AUTOMATIC HIGH SPEED
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FIRST! SECOND to none! SUPERIOR to all! Because the above, three high scoring features challenge former production figures — costs and maintenance. Tried and proven high operating speeds permit feeding, stamping, piercing, forming, swaging and cutting of difficult materials — accurately. Let your DECISION be PRECISION — a true machine tool champion.

PRECISION WELDER & FLEXOPRESS CORP.
136 E. McMICKEN AVE. CINCINNATI 10, OHIO

SAWING MILLING



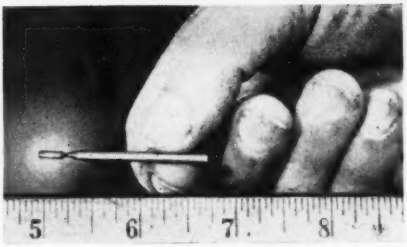
GROB BROTHERS
GRAFTON WISCONSIN

for lubricants; minimize friction; ensure long life between grinds; and provide for maximum production since the tendency of chips to accumulate on the cutting edges of the tools is claimed to be eliminated.

Miniature Grinding Wheel Designed for Grinding Extremely Small Holes

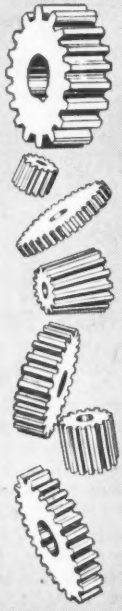
Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago 7, Ill., has announced an extremely small mounted wheel or abrasive point, as illustrated herewith. Only $\frac{1}{16}$ inch in diameter, the miniature mounted wheel is designed for grinding very small holes in bearings, bushings, and instruments, as well as for similar precision applications.

According to the manufacturer, exact duplication of even the most minute parts is possible with the small mounted wheel.



Chicago Miniature Grinding Wheel

GREAVES SILENT BAKELITE GEARS



THEY'RE STRONG, SILENT!

You'll appreciate the smooth, silent operation of Greaves-Silent Bakelite Gears. You'll marvel at the big power loads they can carry . . . and their remarkable ability to operate successfully when completely submerged in water. Cost is low so you'll save plenty of time, money and labor. Silent gears of rawhide and Fabriol also available.

• WRITE FOR CIRCULAR



IMMEDIATE DELIVERY on blanks sawed to specified diameter and face

★ GREAVES

THE GREAVES MACHINE TOOL CO.
2700 EASTERN AVE. CINCINNATI 2, OHIO

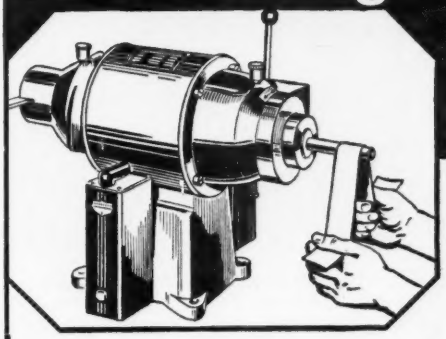
Screw Machine Chucking Lever

A line of chucking levers for screw machines is now being marketed by Boyar-Schultz Corp., 2120 Walnut St., Chicago 12, Ill. Designed for use on No. 00, No. 0, and No. 2 screw machines, the chucking levers are made of high alloy materials which provide for long life. The levers are available in various sizes and are supplied in packages of six.

Cut Polishing Time up to 80%

with

SCHAUER SPEED LATHES



Users report production increases of 50% to 100% over former methods when Schauer Speed Lathes are used to polish, lap, de-burr or finish metal or plastic parts. These high-production machines do the job speedier, better, and at lower cost.

Write for BULLETIN 500 showing types for all secondary finishing operations.

SCHAUER MANUFACTURING CORP. – **Originators of Today's Speed Lathes**

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Dependable **MEASURING & CHECKING EQUIPMENT**

and Now

HAND WHEELS, KNOBS, HANDLES

Cadmium Plated READY TO DELIVER

Non-rusting — good looking



STRAIGHT and OFFSET TYPE



SOLID ROTARY

MACHINE HANDLES



CAST IRON



MALLEABLE IRON

We also build jigs, fixtures, special tools and machinery. Send us your blueprints.







UNIVERSAL ANGLES

In 10 sizes, ranging from 4 x 3¾ x 5 and up.

BOX PARALLELS

In 15 sizes, ranging from 3 x 4 x 12 and up.

SLOTTED ANGLES

In 19 sizes, ranging from 4 x 9 x 3 and up.





SURFACE PLATES

Over 50 sizes, ranging from 7 x 7½ to 96 x 192.

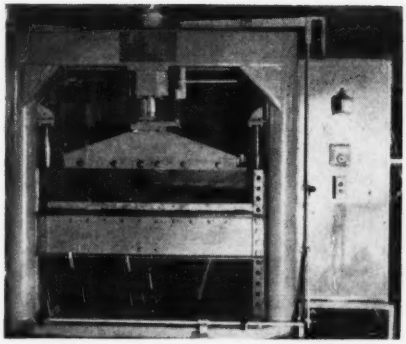
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MACHINE PRODUCTS CORPORATION

6773 E. McNICHOLS ROAD • DETROIT 12, MICHIGAN

Hydraulic Arbor Press Has 30-Ton Capacity

Standard Designers, Inc., P. O. Box 6218, Asheville, N. C., has announced a hydraulic arbor press with a 30-ton capacity and a 12-inch ram stroke. Known as the "Super Draulic," the press is said to have exact pressure controls and is easily tooled for a wide variety of operations, such as bending, forming, straightening, forcing, extruding, flanging, crimping, stamping, punching, and other high-speed metal-working operations. According to the manufacturer, control of the press is at the operator's finger tips, thus providing for rapid, safe, and easy operation.



"Super Draulic" Hydraulic Arbor Press

The Super Draulic is built in a wide variety of sizes and models to meet individual requirements. Each model is furnished complete with motor-driven pump and all necessary gages and controls.

QUALITY ACCURACY COLLIS DURABILITY SERVICE



USE-EM-UP TYPE

STANDARD TYPES

SLEEVES AND SOCKETS AND A complete line of COLLETS

• COLLIS Taper Tools are made by men skilled in this type of manufacture. Users get long satisfactory service from COLLIS Equipment and find the answer to all drilling, reaming, and tapping needs in the COLLIS line. We can give prompt service on orders for Lathe Centers, Arbors, Drill Drifts, and Magic Type Chucks as well as on Sleeves and Sockets and Collets.

THE COLLIS CO.

DEPT. A, CLINTON, IOWA

Device Locates Centers on Unsymmetrical Workpieces

Known as the "Centr-Finder" Vise, a device which is designed to find centers on runs of material regardless of shape has been announced by Black Drill Co., Inc., 1372 E. 222nd St., Cleveland 17, Ohio. The device consists of two opposed pneumatic cylinders mounted on a cast iron base with two master jaws at the ends of the rods attached to the pistons. The jaws travel along guides, and the movement of both jaws is mechanically synchronized. The unit operates on from 5 to 100 lb. air pressure, depending upon

KELLY Fast Grip Toggle CLAMPS

FEATURES: More Positive gripping control—Balanced design—Efficient operation. Clamps for: Welding, woodworking; drill press; gluing and assembly.

Write for Literature.

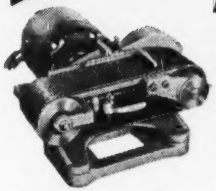


R. J. KELLY MFG. CO. Model 257

P. O. Box 61 (Broadway Sta.), Newport, R. I.

DOES IT BETTER
DOES IT FASTER

SIMPLEX-M
ABRASIVE BAND GRINDER

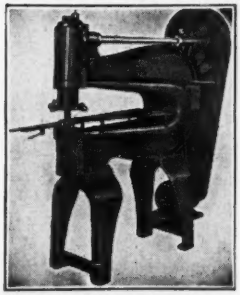


The precision of a machine tool plus the durability of a workhorse. Complete with ½ H.P. Heavy Duty Motor and automatic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

OTHER STYLES AND SIZES IN NEW MANUAL ON FINISHING—WRITE TODAY

WALLS SALES CORP.
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SAVAGE
NIBBLING MACHINES



CAPACITIES UP TO AND INCLUDING ¾" MILD STEEL

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ASK FOR FREE BULLETIN "I"

—

"NIBBLE YOUR COSTS"
FOR TUBE SLOTTING, TUBE SHAPING AND CUTTING FLAT SHEETS BY TEMPLATE OR TO A SCRIBED LINE.

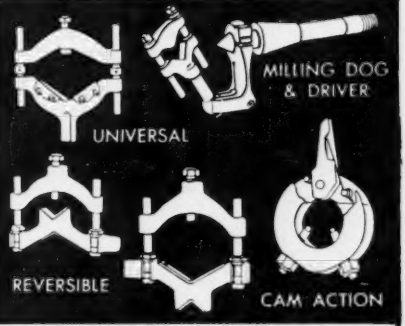
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Knoxville *Since 1885* Tennessee

PIONEER MFRS. OF NIBBLING MACHINES

RED-E
GRINDER-MILLING MACHINE DOGS for EVERY application!

• Special *exclusive* RED-E features mean unmatched versatility for ***GREATER SAVINGS*** in *time, labor, money*. Quick changeovers, simple installation, finger-tip control, perfect balance, accuracy and ***adjustability*** assure greater economy, mirco-precision and stepped-up production that you can't afford to pass up!

Complete range of sizes!
Send for the RED-E Bulletin now!



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RED E TOOLS READY TOOL COMPANY

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Export Dept.: E. 43rd St., New York 17, N. Y.

ERRINGTON TAPPERS . . .

the COMPLETE LINE . . .

the LEADING LINE SINCE 1891



FRICTION

For blind holes, tapping in steel, copper, etc. wherever there is danger of breaking taps.

Errington specializes in the manufacture of high speed multiple drilling and tapping attachments. The name Errington is your assurance of top-quality products . . . your assurance of the finest and most modern tools to produce first-grade workmanship at minimum operating costs.

QUICK-CHANGE

Tool-Holders to Drill, Tap and Set Studs, etc., without moving work, or stopping or reversing machine. Individual friction adjustment in each tap-holder, if required.

POSITIVE

For through holes where work is drilled and then re-handled and tapped.

BALL BEARING CONE-DRIVE

Designed for Ball Bearing High Speed Drill Press.

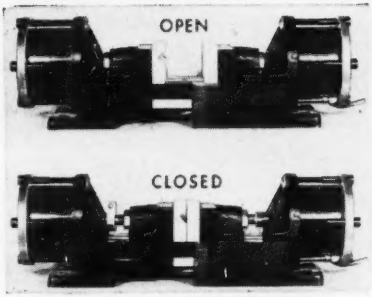
These Tappers may also be adapted for button or acorn die threading.

Write for Complete Information

ERRINGTON Mechanical Laboratory, Inc.

Established 1891

Main Office and Plant **STATEN ISLAND 4, NEW YORK**



Black "Centr-Finder" Vise

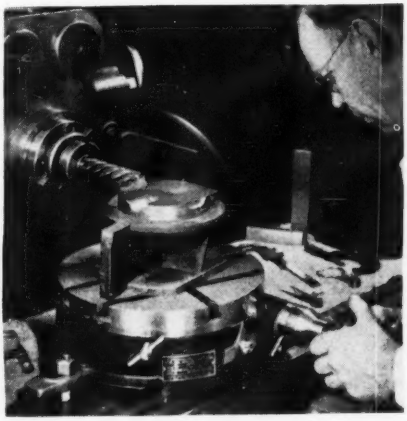
the force desired at the jaws.

According to the manufacturer, the jaw tolerances from the established center line is plus or minus 0.001-inch at any dimension of jaw closing, with a working range of from 0 to 4 inches. Each jaw is independently adjustable from the center line to accommodate workpieces other than symmetrical. False jaws to meet various requirements can be fitted to the master jaws.

Rotary Table Features Four Longitudinal T-Slots

Kenco Mfg. Co., 5211 Telegraph Rd., Los Angeles 22, Calif., has announced a 12-inch high precision rotary table which is made of a Sorbocast casting for maxi-

Kenco 12-Inch Rotary Table in use



Standardize on

hall COLLET CHUCKS

for SPEED, ACCURACY, ECONOMY



Automatic adjustment speeds up production in multiple operations with push-out type HALL COLLET CHUCKS. Full spindle capacity or over. Tremendous grip over or under stock size to .007—without adjustments. All grip ...no slip. No bearings...no heat or lost power. Instant release without stopping lathe.

SATISFACTION GUARANTEED!

Made in Two Sizes to Fit Your Requirements:
Model A...1" (max. capacity 1-1/16")
Model B...2" (max. capacity 2-1/16")
Round, square or hexagon collets, plain or serrated

Write today for illustrated catalog and price list

HALL MANUFACTURING COMPANY
622 TULAROSA DRIVE, DEPT. B, LOS ANGELES 26

Users say—"HALL IS BEST OF ALL"

MARK and DEMAGNETIZE IN ONE OPERATION

THE Luma WAY



The Luma combination etchtool and demagnetizer, etches, demagnetizes, anneals and solders. Permanently marks hardest steel with ease of a pencil. Write for complete information.

Luma Electric Equipment Co.
P. O. BOX 132-MS TOLEDO 1, OHIO

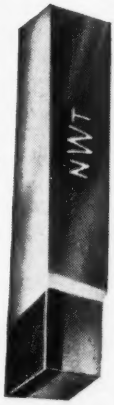


A FEW "POINTS" TO REMEMBER

When in need of the best in Carbide tools remember to specify "NORTH-WEST"!

Tips are full-sized, uniformly brazed, have sturdy shanks and diamond ground cutting edges. Tipped with Carboloy cemented Carbide.

LOOK for this mark of quality



Consistent performance regrind after regrind!

Precision built flat, single point, carbide cutting tools.

Carbide cutting tools made to your own specifications. Distributors in all leading cities.

A complete line of Standard Carbide cutting, turning and boring tools.

Write for catalog.

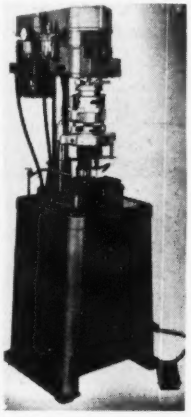
THE NORTH-WEST TOOL COMPANY, 8 North Kilmer St., Dayton 7, Ohio

mum strength and which features four longitudinal T-slots to allow for unusual versatility. The top of the table is graduated from 0 to 360 degrees, and the dial is graduated in minutes to permit close indexing. The table incorporates an adjustable marker to aid in fast setups, an eccentric cam which disengages the worm for high production indexing, and an adjustable stop for positive return. According to the manufacturer, the table has an accuracy of within 0.0005 inch in concentricity runout and 0.001 inch in parallel top to base.

All working parts of the table are enclosed to protect them against grit, dust, and dirt. The pilot hole is easily accessible from the underside for center clamping or pulldown.

Tapping and Drilling Machine Can Be Used with Multiple or Single Spindle Heads

Ettco Tool Co., Inc., 498 Johnson Ave., Brooklyn 37, N. Y., has announced an electric-air controlled tapping and drilling machine, designated as the No. 74, which is designed for use with either multiple or single spindle heads and with provisions for interchangeable work holders. The machine, it is claimed, can handle a wide range of drilling and tapping requirements at high production rates.



Ettco-Emrick No. 74 Electric-Air Controlled Tapping and Drilling Machine

The machine features an electrically-controlled four-way air valve with a built-in up-and-down speed control. The machine can be operated on a continuous automatic cycle or adapted for single-stroke operation.



FLEXIBLE COUPLINGS

Soundly engineered, LOVEJOY Flexible Couplings provide maximum alignment correction for smooth power transmission. Vibration, starting torque and shock of intermittent loads are dampened and absorbed. Operational efficiency and economy is increased, motor and machine protected—their service life lengthened. The end result is not only a more profitable, but an improved finished product.

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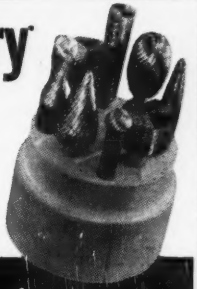
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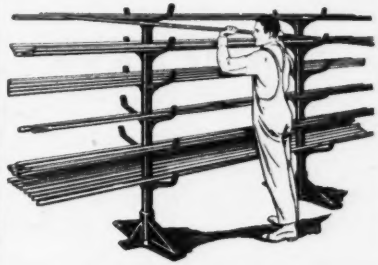
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The BROWN SECTIONAL RACK saves the time previously lost in end-hauling each bar of stock its entire length from the old-style, closed-side Rack, the Brown Rack requiring but a few inches of side movement. Each length, width and thickness of stock is displayed in gold-fish visibility for instant selection. Workmen waiting for stock are served without waste of time.



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It is a simple, durable article made of metal in five styles. It can't burn, warp, sag or twist; depreciation is practically nil. SEND FOR BULLETIN No. 26-B DESCRIBING

BROWN'S *QUICK-SERVE* RACKS

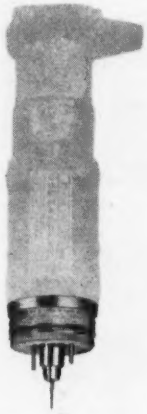
BROWN ENGINEERING CO.
120 N. THIRD ST. READING, PA.
RACKS • VISES • CLUTCHES • COUPLINGS

Tapping Chuck Provides for Precise Control of Small Taps

A finger-tip control tapping chuck which is said to provide extreme sensitivity and precise control of small taps in high volume production work has been introduced by Commander Mfg. Co., 4224 W. Kinzie St., Chicago 24, Ill. Designed for use with the Commander Tapper, the chuck permits maximum use of the tapper's spring clutch drive and adjustable torque control features.

In operation of the chuck, the tapping head remains in fixed position, as actuation of the tap is entirely controlled by the operator's fingers on the finger-tip chuck. Employing a unique drive engaging collar, a $\frac{1}{8}$ turn of which engages or disengages the tap from the driving mechanism, the chuck permits the operator to "feel" the tap as it enters or leaves the work. Vertical movement of the tap to $\frac{3}{4}$ inch is controlled by the operator's finger tips.

In bringing operator control as close to the tap as possible, the finger-tip chuck, it is claimed, not only increases sensitivity but eliminates lost time and waste motion. Maximum operator comfort and visibility of the tapping operation are also said to be provided by the chuck, as the operator's attention is always at work level. In addition, tap breakage is claimed to be considerably reduced because the operator has complete control of the tapping operation and can instantly reverse the tap when necessary so as to protect it from possible damage.

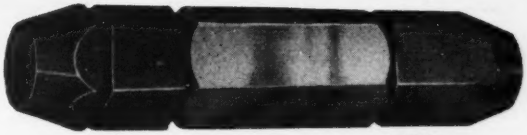


Commander Finger-Tip Tapping Chuck



COLLET TYPE PIN GAGE HANDLE

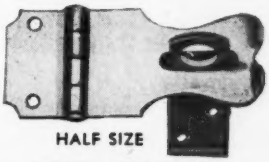
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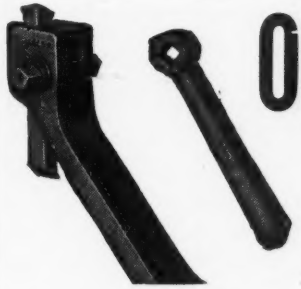
S&S

WITH OR WITHOUT HOLES

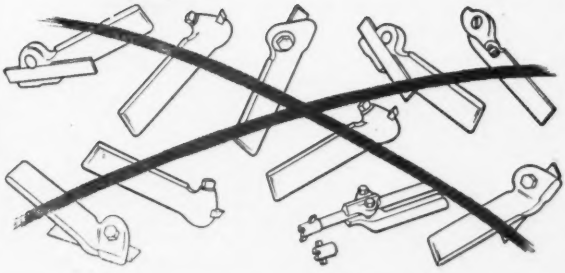
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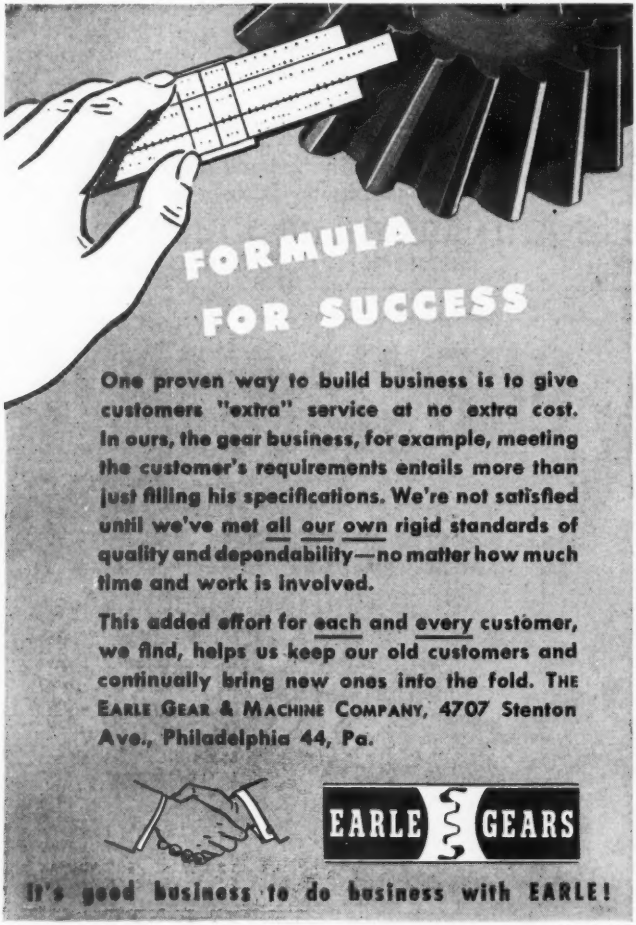
73 WEST BROADWAY
NEW YORK 7, N. Y.

Stub Taper Turret Toolholder Designed for Turret Lathes and Screw Machines

Scully-Jones & Co., 1967 S. Rockwell St., Chicago 8, Ill., has announced a sleeve-type stub taper turret toolholder designed for holding counterbore cutters, countersinks, core drill cutters, and similar tools having standard stub taper shanks. The holder is said to shorten the projection or overhang between turret and work, thus assuring a simple but rigid setup. The holder is hardened to minimize nicking and burring, and the o.d. is ground to provide a snug fit in the hole of the turret. The splined section engages the tang on the shank of the cutter for a positive drive, minimizing slippage and cutter damage. The holder is available for Nos. 2, 3, and 4 stub tapers.



Scully-Jones Stub Taper Turret Toolholder



Hand Blade

W. O. Barnes Co., Inc., Dept. B, 1297 Terminal Ave., Detroit 14, Mich., has announced a high speed hand blade, known as the "Rocket," which is said to combine unusual cutting ability with flexibility and safety. The teeth of the blade are hardened while the back is semi-hardened to retain maximum flexibility in the cutting of a wide variety of metals in various shapes.



Illustration depicting the flexibility of Barnes "Rocket" High Speed Hand Blade

Columbia

TOOL STEELS for all tools for all purposes

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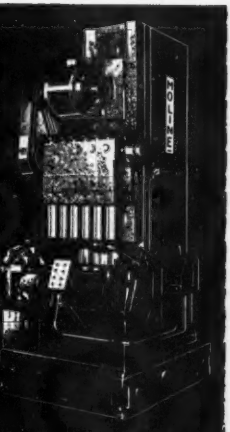
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TOOL COLUMBIA STEELS

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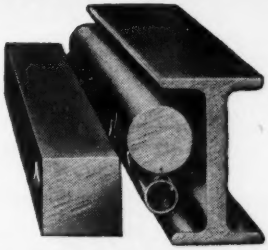


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DRILLING
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Atlantic

WAVY SET BANDS . . .

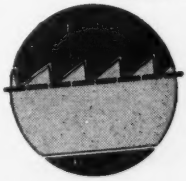


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GANG CUTTING!

Specially designed teeth clear away chips for speedier—cooler—precise cutting. Atlantic Wavy Set Bands have precision milled, even set teeth that slice through multiple drill rods, bar stock, I beams or tubing for gang cutting efficiency.

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The band saw teeth—and *only the teeth* are scientifically hardened to guarantee the sharpest, keenest cutting edge. The entire saw body remains flexible. This precision heat treating increases blade life—saves blades, down time and dollars!

Atlantic engineered with a wave of teeth to the left, then to the right to sweep away chips during cutting. Saw operation is Free! Easy! Efficient! Better finishes result with no chips to score or mar work.



FREE! This pictorial story on Atlantic Wavy Set Bands. Send for your copy today.



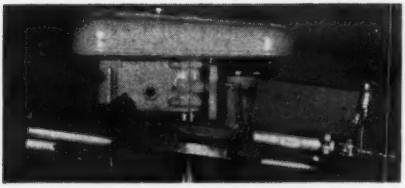
Atlantic

ATLANTIC SAW MFG. COMPANY, Inc.
158 Brewery St., New Haven, Conn.

Drill Press Feed "Feels" Its Way Through the Work

The Bellows "Sensitorque" Drill Press Feed now being manufactured by The Bellows Co., Dept. MMS, 230 W. Market St., Akron 9, Ohio, is designed to minimize drill breakage encountered in deep hole drilling by measuring the torque on the drill. Thus, it "senses" the action that is taking place in the bottom of the hole and assures that the drill is withdrawn only when the strain approaches the danger point.

The Sensitorque consists of a sensor cabinet mounted on a standard Bellows Model DFE 2-540 drill press feed. If the drill becomes clogged with chips, runs dry of coolant, hits a blowhole, or siezes in any way, an electrical impulse is instantly sent to the drill press feed which withdraws the drill and then immediately and raipdly returns it to working position. The amount of withdrawal is adjustable. A Bellows Hydro-Check gently eases the drill into the work to prevent the drill point from striking the bottom of the hole on its return with a shattering impact.



Bellows "Sensitorque" Drill Press Feed installed on a drilling machine

The Bellows Sensitorque can be readily installed on any standard drill press. With the toggle switch on the sensor cabinet in the "Sensor Off" position, it will operate as a standard Bellows drill press feed which will advance and retract the spindle any predetermined distance at a controlled rate of speed. With the toggle switch in the "All On" position, it becomes a torque sensitive deep-hole drilling device. With the toggle switch in the "All Off" position, the drill press can be

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FOR 2 OR 3 DIMENSIONAL WORK

Will Produce . . .

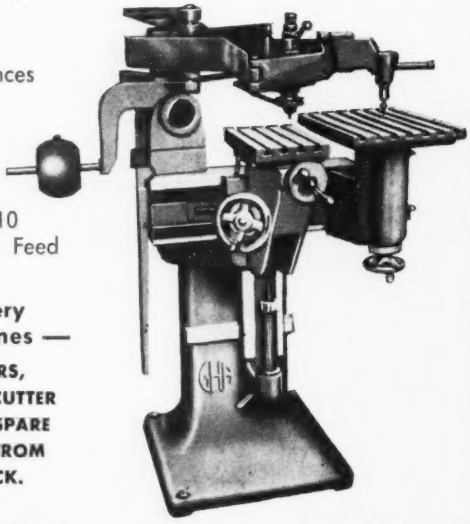
Minute Details
Fine Finishes
Exacting Tolerances

Increased Capacities

Minimum Ratio 1:1.5; Maximum Ratio 1:10
Fine or Coarse Feed Adjustments

Prompt Delivery On All Machines —

SPINDLES, CUTTERS, ATTACHMENTS, CUTTER GRINDERS AND SPARE PARTS SHIPPED FROM NEW YORK STOCK.



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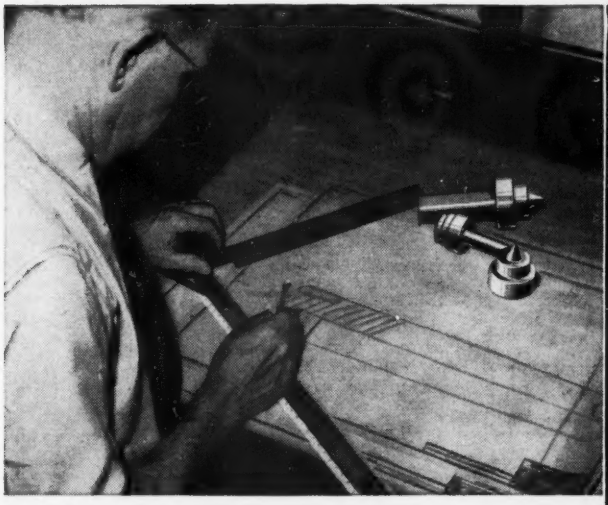
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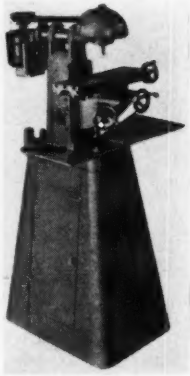
Engineered Live Centers . . A properly designed Live Center is one of the fundamentals of setting up a job and requires a specialist's experience. Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action that compensates for expansion due to heat shock and excessive thrust loads—reducing wear to a minimum. Send us your blueprints and specifications—we will see that your job is set up with the right Live Center. Standard shanks with Morse taper carried in stock.

operated by hand by throwing the disengaging gear into the vertical position and inserting a hand lever in the pinion hub. The Sensitorque is supplied completely assembled and wired.

Pedestal and Splash Tray for Benchmaster Miller

Benchmaster Mfg. Co., 1835 W. Rosecrans Ave., Gardena, Calif., has announced that the Benchmaster Miller, long supplied for bench use, is now available with a new pedestal, rolled from sheet steel. The pedestal is table height, matches the base dimensions of the mill, and flares out at the foot to provide a substantial and secure mounting. The inside area of the pedestal accommodates the Benchmaster M-21 coolant system or can be used for storage purposes. The pedestal measures 10½ x 18 inches at the top, 18 x 26 at the base, and 30 inches high overall. The door in the pedestal measures 11½ x 22 inches.

For more cleanliness in working with coolant, an additional new accessory is available for the Benchmaster Miller in the form of an all-steel splash tray, which is designed to fit the standard Benchmaster base, diverting coolant to the sump return. The width and length of the tray are such that protection is afforded over the full table extensions, both longitudinally and transversely. The edges of the tray are rolled and beaded for extra strength and the elimination of sharp corners. Flanges are provided for fastening the tray to the machine base. The splash tray may be used with both horizontal and vertical Benchmaster Milling Machines.



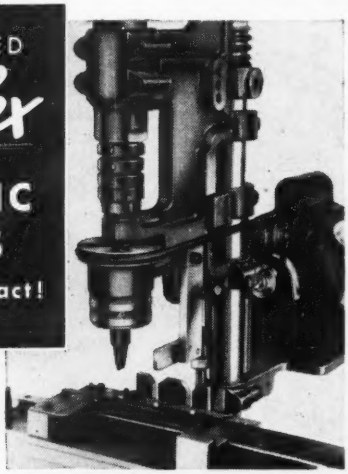
Benchmaster Miller with Pedestal and Splash Tray

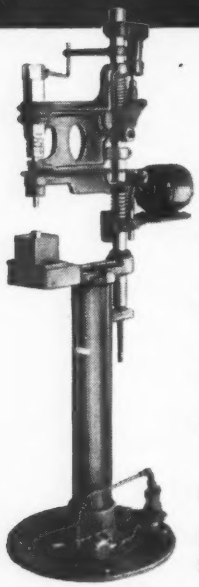
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PNEUMATIC RIVETERS

with rotating impact!





SAFER PRECISION RIVETING on All Types of Materials

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★ Engineered for precision adjustment to fit the job. Fully tested.

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Send samples of your work for free riveting, cost of equipment and true estimate on production.

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The nameplate on your product is your signature. Keep it neat and legible! Accurate location and alignment are assured with this

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THE *JOHNSON 706* HARDENING, TEMPERING and ANNEALING FURNACE

Select any temperature you require from 300° to 1875° F. Get clean, uniform heat at low cost. The Johnson 706 is easily regulated. Six direct jet bunsen burners have separate valves and pilot lights. Firebox 7 x 13 x 16½ lined with high temperature refractory. Counterbalanced door opens upwards.

No. 706 Pedestal (illustrated) $278.00
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No. 654 with 5 x 7¾ x 13½ firebox:
Pedestal $150.00
Bench $124.00

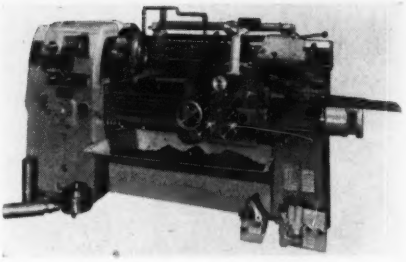
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FURNACES FOR INDUSTRY

Copying Lathe Makes 90-Degree Cuts on Workpieces

The "Sensitast" Copying Lathe introduced by Cosa Corp., 405 Lexington Ave., New York 17, N. Y., has a unique copying device, controlled by electromagnetic clutches, which is said to make 90-degree cuts on the left or right side of a workpiece. It can copy practically any outside or inside form. The traverse and longitudinal feeds operate at the same rate to produce a smooth, uniform finish on the entire workpiece. To obtain a higher degree of finish, a feed reducer with magnetic clutch control is employed. Extremely heavy cuts can be made because of the unusual headstock design and rigid construction of the frame.



"Sensitast" Copying Lathe

The inverted V-ways, filled with oil at all times, and lead screw and rack are inside the bed and covered with telescopic steel plates for protection against chips and dirt. The tailstock, steady rest, and template are supported on vertical ways at the rear of the machine. This permits the tailstock to pass over the saddle without interference.

The lathe has a 17-inch swing over the cross slide, 28-inch swing over the saddle, and 37-inch swing over the bed cover. The distance between centers is 39 inches.

Automatic Sprayer Outfit Includes 10-Gallon Air Storage Tank

Designated as the Model 990 DeLuxe, an automatic tank sprayer announced by W. R. Brown Corp., 2649 N. Normandy Ave., Chicago 35, Ill., includes a diaphragm type, completely oilless ball bearing compressor. The 10-gallon welded steel air storage tank of the unit is equipped with an automatic pressure switch which starts the motor when pressure in

READING BENCH KEYSEATER

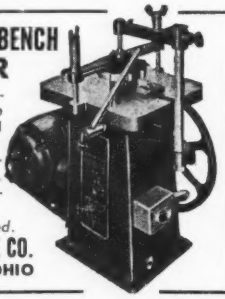
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3¾" stroke; adaptable for other work.

Low first cost — prompt delivery.

Good dealers wanted.

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GRAY TURRET HEAD METAL CUTTER OR NIBBLER

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Most modern Nibbler for Template Cutting, Tool Rooms, Shipbuilding, Aircraft Parts, Aircraft Tubing, Sheet & Plate Shops.

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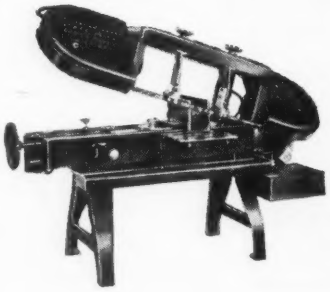
Blade Size ¾"x.032x11'6"

Floor Space 20"x66"

Blade Travel 60, 90 and 120 ft. per minute

Swivel Vise 45 degrees in either direction

Wt. Appr. 500 lbs.



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. . . investigate this new Model H hinge-type saw, the economy model in W. F. Wells & Sons' line of metal cutting equipment. One-piece frame lowers hydraulically. Coolant system and other accessories available. Send for literature today.

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STOP Oily Floor Mishaps with FULLER'S EARTH

Avoid costly accidents caused by slipping on oily or greasy floors! Reduce fire hazards! Replace sawdust or wood shavings with Fuller's Earth. Every shop needs this low-priced safety aid. Fuller's Earth *absorbs* oil and grease—and it's non-inflammable. Write for FREE SAMPLE to test.

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NEW Re-Designed Added Features

POWER FEED FOR FACING

A Boring Head That Won't Face Is Not Complete.

Boring, Facing, Turning, Grooving, Undercutting—All in ONE Toolhead

CHANDLER TOOL COMPANY
Muncie, Indiana

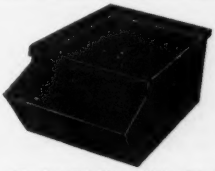
COMBINED BORING & FACING TOOL HEADS
Chandler-Duplex



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"Stack Up"



Sterling Bin Front "Top Rim" Steel Stacking Box. Size: 18" x 12" x 6".

THESE BOXES AGAINST ANY!

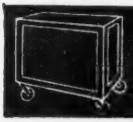
Once you use and compare Sterling stacking boxes, you'll know why we invite comparision in design, construction, and price. Our "Top Rim" construction provides stronger support all around the box . . . no corner inserts to become loose and fall out. Efficiency in designing and manufacturing allows us to quote favorably on any type or size stacking box.

Write for literature and prices.

Sterling Factory Equipment Co., 183 Charles St., Providence, R. I.

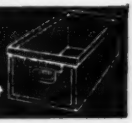


Sterling "Top Rim" Steel Stacking Box with drop handles. Size: 18" x 12" x 6".



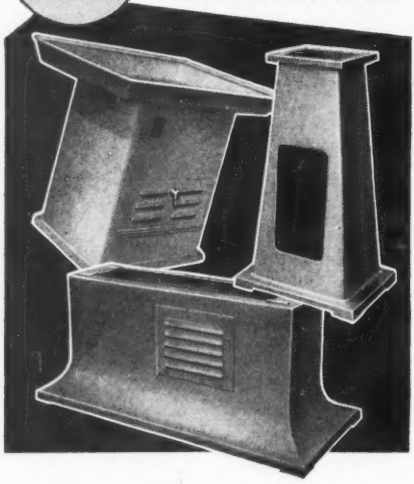
Sterling

Quality Handling & Storage Equipment



machine bases

FABRICATED TO YOUR SPECIFICATIONS



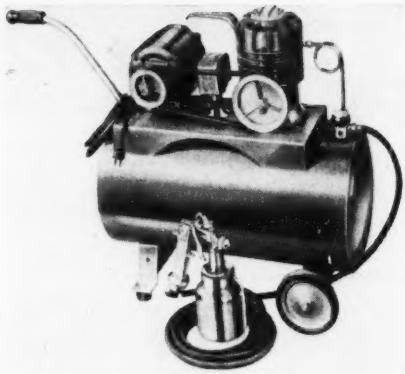
Fabricated Machine Bases lend themselves to efficient, modern design and utilize the economies of welded steel. By reappraising your products for steel, you can initiate many cost-cutting opportunities in manufacturing because:

STEEL COSTS LESS—Pound for pound you can buy steel for less than cast iron at the cupola.
STEEL DESIGN USES LESS MATERIAL—Steel is three times stronger than iron and fabricated units have all the inherent strength and toughness to withstand shock, strain and vibration.
MANUFACTURING COSTS ARE LESS—Fabricated Bases adapt themselves to design, improvements and changes at any time with the minimum of cost.

Send blueprints to Littleford. See how Fabricated Bases can save you money.

LITTLEFORD

LITTLEFORD BROS., INC.
433 E. Pearl Street, Cincinnati 2, Ohio



Brown Model 990 DeLuxe Tank Sprayer

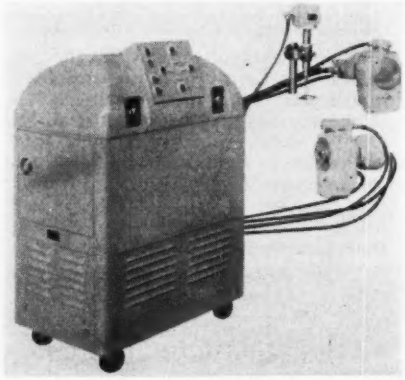
the tank drops to 30 lb. and stops the motor when pressure reaches 45 lb. The motor is a ⅓ h.p. 110-volt 60-cycle a.c. type with 10-foot cord and plug.

Easily portable, the unit is mounted on rubber-tired wheels that may be removed for stationary shop use of the unit, which also has a rubber-tired rest and removable handle with rubber grip. In addition, the outfit is equipped with a tire inflater chuck, 15-foot air hose, and spray.

Product Duplicating Device

Known as the Lodge & Shipley Duplicator, a device, which when used with a mill or lathe makes possible the automatic duplication of machined internal and external profiles and contours on a

Lodge & Shipley Duplicator





No. 4B PUNCH

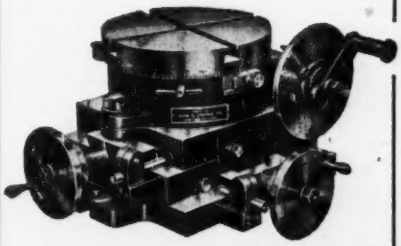
Capacity—1/4" hole thru 1/16 gage iron.
Length—8½"; Depth of throat—2".
Weight—3 lbs.
Stock size punches—1/16" to 9/32" by 1/64". Can be had complete in metal box as shown or in cardboard carton.

W. A. WHITNEY MFG. CO.
640 Race St. Rockford, Ill.

The Stevens Line Since 1925

No. 1 COMPOUND TABLE

With 7½" Dial Type Rotary Table Mounted



We also make a No. 2 Size for 12" Rotary Table. Can be had without Rotary Table.

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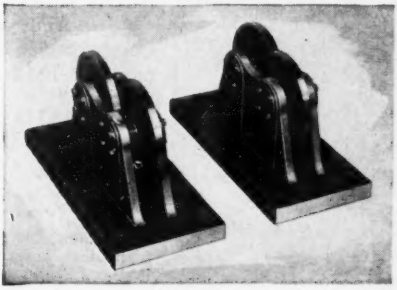
Rotary Tables • Multiple Spindle Index Centers • Vises • Screw Head Slotters

The John B. Stevens Company
Main Street, Somersville, Conn., U. S. A.

Pillow Block Balancing Ways

for large diameter work

Anderson Pillow Block Balancing Ways are especially suited for large diameter work as a sub-base can be made of proper height to give necessary clearance.
Precision built with chilled iron discs which rotate with minimum friction on sensitive special Bearings. Widely used for efficient, static balancing.



ROCKFORD
Anderson
BROS. MFG. CO.
ILLINOIS

Built in 1,000, 2,000, 5,000, 10,000 and 20,000 Capacities

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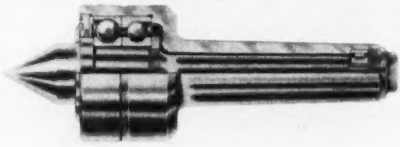
ANDERSON BROS. MFG. CO., Rockford, Ill.

Balancing Ways, Roto Checkers, Hand and Power Scrapers, Spotters, Hand and Power Hydraulic Straightening Presses.

production basis, is now being distributed by Tracer Control Co., 595 E. 10 Mile Rd., Hazel Park, Mich. The device is said to accurately control two feeds of the machine for reproducing from a template or original model or workpiece difficult compound curves as well as 90-degree shoulders. It acts as an attachment to the machine and does not have to be removed for use of the machine on other work without interference. The duplicator can be moved from machine to machine as the need arises and allows any machine with which it is used to operate at normal feeds and speeds in milling, turning, boring, and shaping.

Anti-Friction Center

Ready Tool Co., 540 Iranistan Ave., Bridgeport 6, Conn., has developed an anti-friction center that is said to maintain extreme accuracy under heavy loads, particularly with carbide cutting tools at high speeds. Identified as the Red-E Superaccurate Anti-Friction Center, the unit features a large head that permits the use of large size bearings for maximum radial and thrust load capacities. The bearings are preloaded anti-friction single-row ball types. The center includes a duplex bearing arrangement in the head and a self-aligning precision roller bearing in the shank. The labyrinth, it is claimed, is made so that cutting oil or chips cannot enter the head and the self-enclosed lubrication cannot escape.



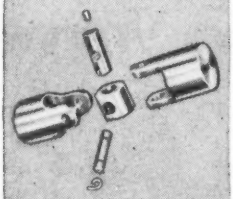
Cutaway view of Red-E Superaccurate Anti-Friction Center

The center is of all-alloy steel construction with a heat-treated spindle. The point is of high speed steel, ground after assembly to assure accuracy. Female or special points may be used if required.

Fewer Parts make easy assembly

Simple construction, fewer parts make assembly and disassembly easy — also mean longer life.

CURTIS UNIVERSAL JOINTS



Simple construction is not the whole story. A combination of modern design, wise choice of alloy steels, with a special heat treatment for each part, give greater strength with less weight. And you can depend on Curtis catalog ratings — they are based on hundreds of actual tests.



ONLY CURTIS OFFERS ALL THESE ADVANTAGES

Availability — 14 sizes always in stock.

Simplicity — fewer parts, simpler construction.

Government Tests — complete equipment for government tests in our plant.

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CURTIS UNIVERSAL JOINT CO., INC.

10 Birnie Ave. Springfield, Mass.

As near to you as your telephone

A MANUFACTURER OF UNIVERSAL JOINTS SINCE 1919

CARROLL
DIVIDING HEADS



Catalog on Request

3 SIZES — 4 MODELS — 6" to 12"

CARROLL DIVIDING HEAD CO.
3525 Cardiff Ave., Cincinnati 9, Ohio

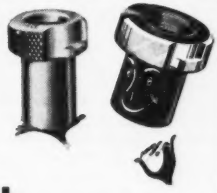
CUTTERS
For Flat Bars
Rods • Angles
Wire Rope • Channels



MADE IN THREE SIZES:
Circulars available on our line of cutters, punches, and benders.

T. H. LEWTHWAITE MACHINE CO.
317 East 47th St. New York 17

Your Special Size MAY BE Our Standard



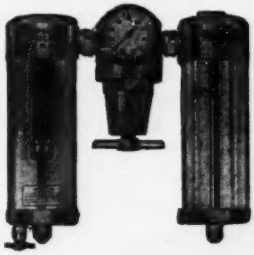


Check with us first. You'd be amazed how many SPECIAL SIZES are standard drill bushings with us—and how often we can meet special needs right from our shelves. ACE Drill Bushings are specified by discriminating engineers everywhere because these better bushings provide MAXIMUM ACCURACY at the RIGHT price. Order your copy of the new ACE Catalog today.

ACE DRILL BUSHING CO., INC
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"M-B"
Automatic Air Line FILTERS REGULATORS and LUBRICATORS

"Sentinel of the Air Line"



FILTER element removes solids .00039 and larger. TRANSPARENT BOWL provides visibility. REGULATOR is capable of passing large volume with an unrestricted flow and minimum amount of pressure drop. Self-bleeding, compact, simple. Machined from bar aluminum. LUBRICATOR delivers desired volume of oil. Adjustable Venturi Valve permits efficient operation on broad range of volume and pressure. Bowl can be refilled without shutting off air supply. These 3 devices can be used as separate units or in any combination.

ALSO PNEUMATIC GRINDERS

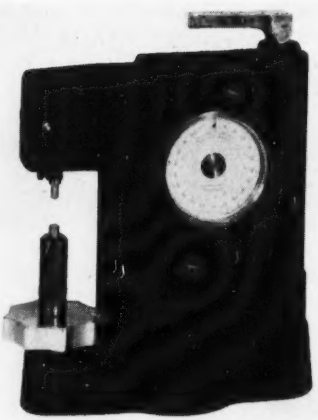
"Remember, Built-in Quality Remains Long After First-Cost Disappears"

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M·B PRODUCTS
46 VICTOR AVE.
DETROIT 3, MICHIGAN

Improved Hardness Tester Is Designed to Test Very Thin Stock

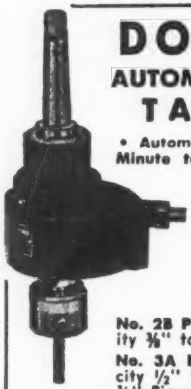
For use in toolrooms, pressrooms, receiving departments, and other places where it is desirable to determine the hardness of metals, J. P. Newman Co., 821 S. Raymond Ave., Alhambra, Calif., has announced an improved hardness tester with a 3-inch capacity. Improvements include the addition of A and D scales to the present C-B and E scales, thus enabling the operator to test very thin sheet steel. Another outstanding improvement is a visional means for setting the tester to different load factors for the different scales used.



Newman Improved 3-Inch Capacity Hardness Tester

Bench Grinder Has ½ H.P. Motor

Thomas Prosser & Son, 114 Wall St., New York 5, N. Y., has placed on the market a bench grinder, designated as the Model AA, which is equipped with a ½ h.p. motor that provides sufficient power for performing a wide variety of bench grinding operations. According to the manufacturer, the power supply is augmented by a large diameter shaft which minimizes vibration and withstands the additional torque resulting from the heavy-duty motor. The grinder also features provision for quick, exact angle setting and a rigid table lock.



DORMAN
AUTOMATIC REVERSE
TAPPERS

- Automatic Torque Control, One Minute to Adjust, Prevents Tap Breakage, Operator Need Not Be Skilled.
- WIDE RANGE TAP CAPACITY.

No. 1A FRICTION DRIVE TAPPER—capacity No. 2-56 to ⅜" in Steel—½" in Aluminum.

No. 2B POSITIVE TAPPER—capacity ⅜" to ⅞" in Steel.

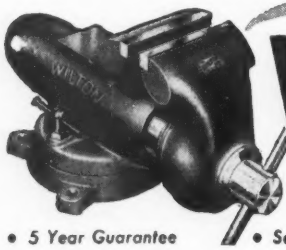
No. 3A POSITIVE TAPPER—capacity ½" to 1¼" in Steel—½" to ¾" Pipe Taps.

No. 4A TAPPER — capacity ¾" to 2" in Steel including Pipe Taps.

- PRODUCTION THREADERS with Round Split . . . Button . . . Acorn Dies.

Priced from $48.00
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THRIFTMASTER PRODUCTS CORPORATION
Division of Thomson Industries, Inc.
1034 N. PLUM STREET, LANCASTER, PA.
STANDARD UNIVERSAL ADJUSTABLE AND SPECIAL FIXED CENTER DRILLHEADS

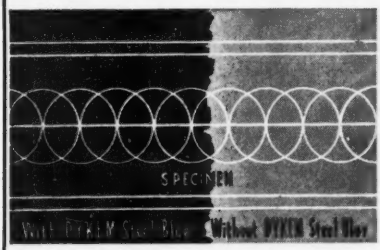


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WILTON
TOOL MANUFACTURING CO.
925-941 Wrightwood Avenue, Chicago 14, Illinois



DYKEM STEEL BLUE

Stops Losses in Making Dies and Templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

THE DYKEM COMPANY

2301F NORTH 11th ST. ST. LOUIS, MO.

You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

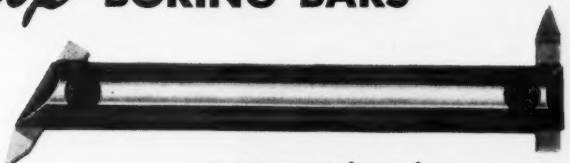


IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money tool

HEIMANN MFG., CO. ● URBANA, OHIO

Shuregrip BORING BARS



DOUBLE END 30° & 90°

Number	1-A	2-A	3-A	4-A	5-A	6-A	7-A
Bar. Dia. In	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2
Length In	7	8	9	11	13	18	23
Cutter In	1/8 Rd.	3/16 Rd.	1/4 Sq.	1/4 Sq.	5/16 Sq.	3/8 Sq.	1/2 Sq.
Price Each	1.95	2.10	2.95	3.25	4.55	10.75	20.80

SINGLE END 30° & 90°

When Ordering—State Angle Required

Number	1-B	2-B	3-B	4-B	5-B	6-B
Bar. Dia. In	3/8	1/2	5/8	5/8	3/4	3/4
Length In	3	4	5	7	8	10
Cutter In	1/8 Rd.	3/16 Rd.	1/4 Sq.	5/16 Sq.	1/4 Sq.	1/4 Sq.
Price Each	1.25	1.35	2.20	2.50	2.60	2.80

Adjustable Boring Bar holders available take bars from 3/8" up to 1 1/2" diameter. T-Blocks made to fit any lathe. Price list on request.

WRITE FOR PRICE ON LARGER BARS

BREAK OFF ON SCORE, AS REQUIRED

1-6" Length—1/8 Dia. H.S.S. Tool Bit Stock—Hardened—each 95¢

1-6" Length—3/16 Dia. H.S.S. Tool Bit Stock—Hardened—each $1.05

Round Tool Bits Furnished in 1-A, 2-A, 1-B and 2-B—All Others Square. 1 Hexagon Wrench Furnished with Each Bar.

Price of Square H.S.S. Cutter Bits.	1/4 x 1	1/4 x 1 1/4	1/4 x 1 1/2	3/8 x 1 7/8
	.20	.30	.40	.65

J. E. FREYMAN & SONS, INC.

3627 KESWICK RD. BALTIMORE 11, MD.

Graphitic Tool Steel in Hollow Die Form

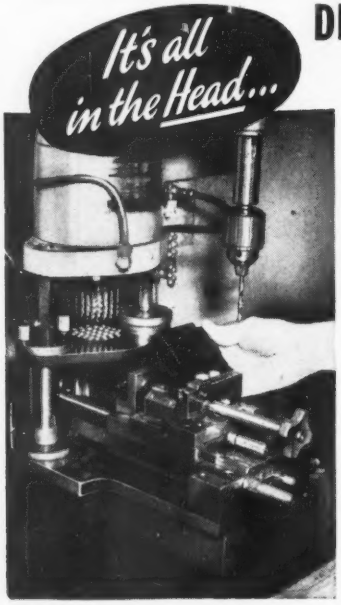
A. Milne & Co., New York, N. Y., has announced the addition of Timken "Graph-Mo" Tool Steel in hollow die (tubular) form to its line of products. Described as an oil-hardening non-deforming tool steel which is said to combine all the advantages of graphitic tool steel, Graph-Mo (JIC-06) has a wide range of applications, including forming, drawing, sizing, flanging, embossing, and combination dies; work support blades; forming rolls; steel mill straightening rolls; machine parts; plug, thread, and ring gages; cams; bushings; sleeves; mandrels; fixtures; and many other uses.

Thread Rolling Attachment Permits Threading Close to Shoulders

Designated as the Series G2A, a thread rolling attachment designed for use on automatic screw machines and turret lathes for close-to-shoulder threading operations has been announced by Reed Rolled Thread Die Co., 237 Chandler St., Worcester 2, Mass. According to the manufacturer, rolling can be done on the collet end of the part behind shoulders, often eliminating secondary operations.

A matching device allows the rolls to be accurately matched by rotating one roll in relation to the other in infinite increments of circular measurements. The head pivots in the adapter, thus permitting the rolls to automatically position themselves in relation to the center line of the spindle on contact with the work. Clearance between the shank of the head and the adapter allows the head to float sideways, thereby easing the side pressure on the rolls as they are fed into the work. Upon completion of the rolling operation, the head returns to the centralized axial position in the adapter.

Class 2A and 3 American Standard and other similar types of threads may be rolled with the attachment. Taper rolls for pipe threads are interchangeable with



DRILLING HOLES AT IBM

• No time lost drilling millions of holes in business machine parts. IBM cashes in on the many features of Zagar Gearless Drillheads: many holes drilled at one pass; any number of holes in any material in any pattern as close as twice drill diameter; accurate spacing maintained. Standard Zagar Gearless Drillheads can be adapted readily to your needs. Send us your parts drawings.

◄ 110 holes on 3/8" centers are drilled in the inserts of molded phenolic block. 20 drills in head; 6 feeds to complete each block.



Get Engineering Manual S-10 for more information on all Zagar's tools for industry.

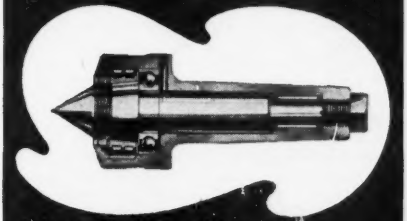
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24000 LAKELAND BLVD.
CLEVELAND 23, OHIO

Zagar TOOLS FOR INDUSTRY and SPECIAL MACHINERY

NIELSEN

Heavy Duty Live Centers



Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

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HOWALD CARBIDE MILLING CUTTERS



- SQUARE BLADES Easily Replaced.
- Simple, Accurate Blade Adjustment.
- Lowest Blade Cost.
- Cutters from 1½" to 14" dia.

PATENTED END MILL



PAT. SHELL MILL

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W. T. HOWALD MACHINE WORKS

182 SIGOURNEY ST., BROOKLYN 31, N. Y.

KIPP *Air Grinders*



- FASTER SPEEDS
- BETTER RESULTS
- LOW PRICES

MODEL JA
50,000 R.P.M.
Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

$42 IN U.S.A.

THEY GRIND—NOT JUST RUB!

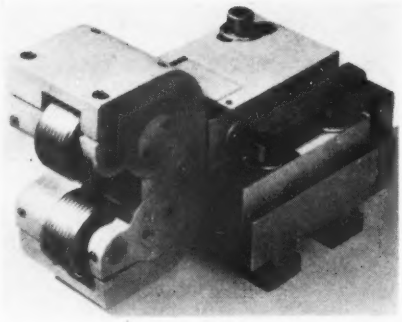
The RPM's stay up while grinding . . . not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind . . . not just rub. Every mechanic knows this, but an inexperienced buyer may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work . . . longer wheel life.

MADISON-KIPP CORP.

208 Waubesa St., Madison, Wis., U.S.A.

Write for KIPP Air Tool *Catalog at 3006*



Reed Series G2A Thread Rolling Attachment

straight rolls within the capacity of the head. The attachment is of the geared type and is available in three standard sizes of ½, ¾, and 1 inch. Special sizes are available for the rolling of larger threads.

Gasket Material Does Not Harden

Flexrock Co., 3615 Filbert St., Philadelphia 4, Pa., has announced a material, known as "Plastic Gasket," which is said to reduce vacuum line leakage to a minimum by simply adding a $\frac{1}{64}$-inch film or coating to flange faces and gasket surfaces. Any slight leakage which may occur after a line has been in service for a while can be corrected without dismantling flanges by applying a $\frac{1}{32}$-inch coating of the material around the outside surfaces of the flanges where they meet with the gasket. These operations, it is claimed, can be repeated, increasing the life of the seal by as much as ten times.

Where flange faces are unmarred and come together true, Plastic Gasket can be used by itself without any other type gasketing material. According to the manufacturer, the material will not harden, making flanges easy to dismantle after years of service. Two types of the material are available · one for air, steam, water, and mild chemicals, and one for oil, gasoline, solvents, and so on.

Victor's Specials Deserve Your Attention!

High Speed Drills...EXTRA LONG LENGTH

Straight Shank No. 1-60

No. By Gage	Length Inches	Our Price Net Each
1 to 10	6¼	$1.00
11 to 20	5¾	.90
21 to 30	5⅜	.80
31 to 40	5¼	.70
41 to 50	4½	.60
51 to 60	3½	.50

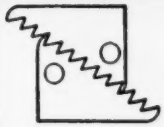
Straight Shank

Size Inches	Length Overall Inches	Length Flute Inches	Price Each Net
1/8	12	9	$1.65
9/64	12	9	1.65
5/32	12	9	1.65
11/64	12	9	1.65
3/16	12	9	1.65
13/64	12	9	1.80
7/32	12	9	1.80
15/64	12	9	1.95
1/4	12	9	1.95
17/64	12	9	2.05
9/32	12	9	2.05
19/64	12	9	$2.25
5/16	12	9	2.25
21/64	12	9	2.50
11/32	12	9	2.50
23/64	12	9	2.75
3/8	12	9	2.75
25/64	12	9	3.05
13/32	12	9	3.05
27/64	12	9	3.30
7/16	12	9	3.30
29/64	12	9	3.60
15/32	12	9	3.60
31/64	12	9	3.60
1/2	12	9	3.60

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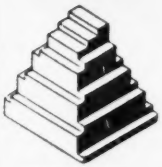
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STURTEVANT TORQUE WRENCHES

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- All Capacities

in inch ounces
...inch pounds
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(All sizes from 0-6000 ft. lbs.)



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A NEUTRAL, NON-INFLAMMABLE, LOW COST, "BUCKET DETERGENT" THAT RUSTPROOFS AS IT CLEANS

IMMUNOL is the most practical approach to "bucket" cleaning and rustproofing of machined parts you have ever seen. It is an odorless, neutral, non-toxic and non-inflammable liquid that is used in long dilution with ordinary water to make that water rustproof, a powerful detergent and a potent wetting agent. Machined parts dipped, sprayed or wiped with IMMUNOL solutions are cleaned of chips and oil and at the *same time* receive a rustproof coating sufficient for indoor, interdepartmental protection.

IMMUNOL protective films are so slight that they can't be seen or felt. They are absolutely dry and will not pick up dust and dirt from the air. This film, though it is easily removed by just plain water, need not be removed before further machining or painting or lacquering.

IMMUNOL is also outstanding as an additive to your soluble oils for additional rust protection, and the same dip used for cleaning machined parts is an excellent solution for washing workers' hands and arms.

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Haas MILLER Corp.
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Slotted Sleeve Facilitates Installation of Tool Bits in Boring Bars And Toolholders

Known as the "Novi," a slotted sleeve designed to facilitate the installation of tools bits in boring bars, toolholders, and cutter heads has been placed on the market by Novi Tool & Machine Co., 43043 Grand River Ave., Novi, Mich. To install the sleeve in a boring bar, one hole the size of the sleeve is reamed part way through the bar, and the sleeve is held in place by a pin. If permanent installation is required, the sleeve may be soft soldered or brazed in place. Two more holes can be drilled and tapped for set screws—one screw to hold the tool rigidly in place, and the other to serve as an adjustment behind the tool itself, preventing the tool from sliding away from the work.

The slotted sleeve can be used for rectangular tool bits, as well as for square tool bits. In the case of rectangular tool bits, two sleeves are installed with the slots facing each other. The sleeve is

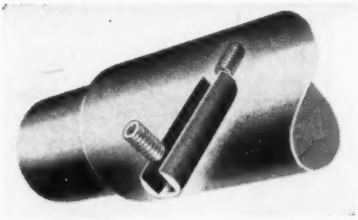
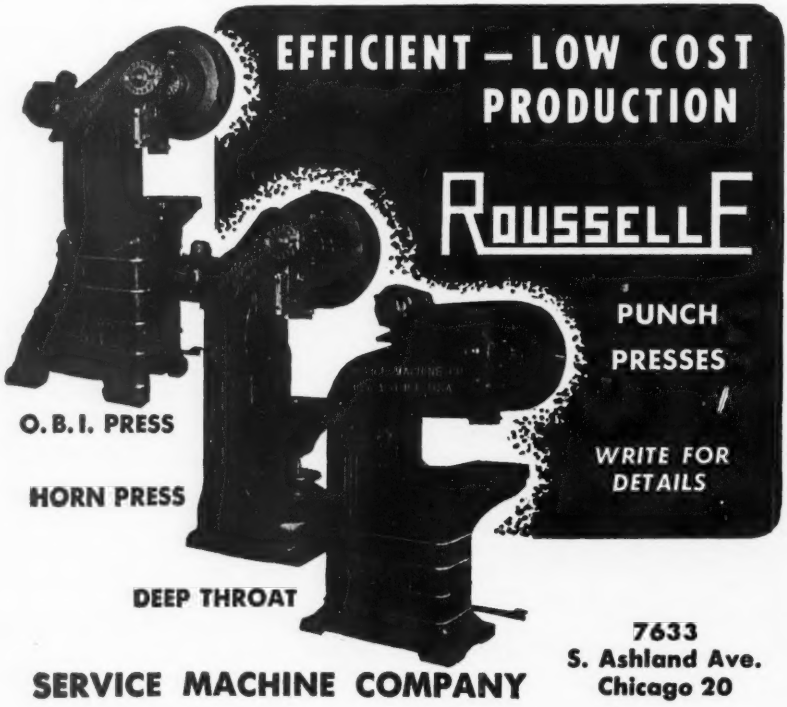
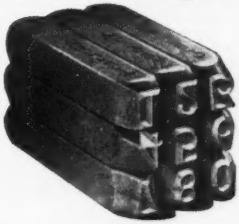


Illustration showing manner in which "Novi" Slotted Sleeve is installed in boring bar

available in sizes for tool bits of from $\frac{3}{16}$ to 1 inch in width and 1 to 4 inches in length.



Why THOR STAMPS Last Longer



. . . because they're made of a special, correctly-heated alloy steel. Central striking point assures uniform marking. Thumb side marking assures easy use.

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USE ECONOMY

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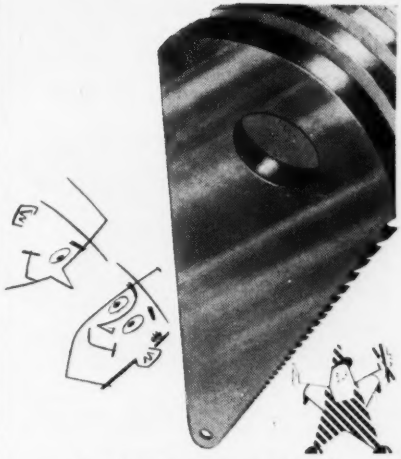
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5212 Lawrence Ave., Chicago 30, Ill.



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STAR "Moly" high speed Power Blades

For over 70 years, industry has preferred STAR quality, preferred the blades made of carefully heat-treated, top-quality steel, fabricated on specially designed equipment—all for the sole purpose of delivering fast, economical metal cutting and long blade life.

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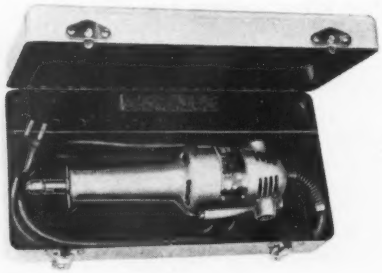
STAR Blades are sold only through recognized distributors. You get *fast* service from local distributors' inventories. You get *economical* service because your distributor knows your operations best, he is easy to reach, he is trained by qualified factory representatives to know the answers to your metal cutting—and hundreds of other—problems.

CLEMSON BROS., Inc.
MIDDLETOWN, N. Y., U.S.A.

Makers of Hand and Power Hack Saw Blades, Frames, Metal Cutting Band Saw Blades and Clemson Lawn Machines

Hand Grinder Accommodates Mounted Wheels and Points

To meet the need of tool and die departments, pattern shops, designers, modelmakers, and professional craftsmen for



Skil Hand Grinder

an extremely lightweight maneuverable, and powerful utility grinder, Skil Corp., 5033 Elston Ave., Chicago 30, Ill., has announced a hand grinder designed for use with mounted wheels and points. The grinder is available in three models designated as the Skil 137, 146, and 148.

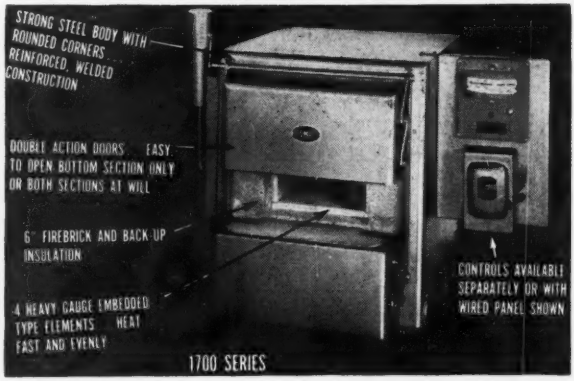
The Model 137 is equipped with a 5/32-inch capacity geared chuck and has a speed of 20,000 r.p.m. The Model 146 has a speed of 20,000 r.p.m. and is available with $\frac{1}{8}$ and $\frac{1}{4}$-inch collet chucks. The Model 148 has a speed of 36,000 r.p.m. and is furnished with $\frac{1}{8}$ and $\frac{1}{4}$-inch collet chucks. The Models 137 and 146 are designed for use with shank accessories of $1\frac{3}{4}$-inch and smaller diameters. The Model 148 has a capacity for 1-inch and smaller shank accessories. Each model is less than 10 inches in length and weighs approximately 2 lb. A steel carrying case with convenient rack for mounted wheels and points is supplied with each model.

Automatic Air Control Valve for Air Suction Systems and Dust Collectors

Known as the "Ventomatic," an automatic air control valve for use with air suction systems and dust collectors on units such as metal grinding and polishing machines, planers, sanders, saws, and similar equipment is now being manufactured by Kindt-Collins Co., 12653 Elmwood

solve heat-treat problems

with versatile Temco bench-type furnace



Step up production, cut costs with Temco electric furnaces for heat treating dies, parts, tools, etc. Model illustrated above one of eight convenient sizes available with either electronic or manual temperature controls. Economical, easy to install and operate, low cost. Priced from $55.00 to $507.50. Write for literature and nearest dealer's name.

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Manufactured by

AUTO MOULDING & MFG. CO.

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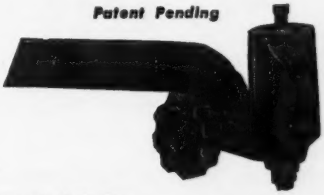
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Monarch Precision

SHAPLANE

Radius Tools

Patent Pending



Five Models for

LATHES, SHAPERS, PLANERS, AND BORING MILLS.

RANGE ½" TO 3" RADIUS (MODELS ALSO AVAILABLE FOR CONVEX CUTTING, AND CONCAVE RADII TO 6" ON PLANERS, ETC.)

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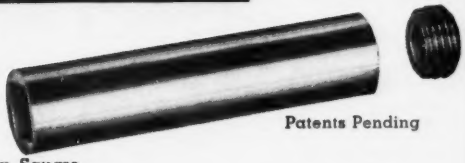
4470 Oakenwald Ave., Chicago 15, Ill.

Phone Drexel 3-3571

How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.

The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.



Patents Pending



BUSHINGS MADE IN FOLLOWING SIZES:

3-16, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 1"

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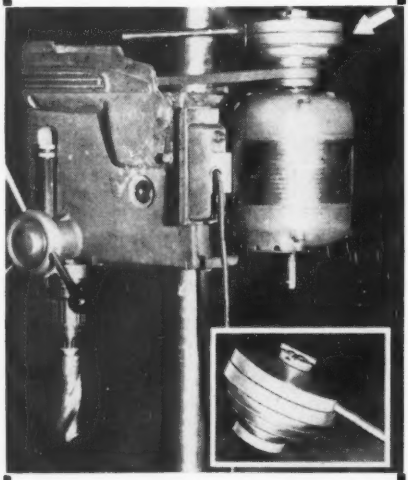
New

"PULL-GEAR"

Speed Reducing Pulley

Increases

Drill Press Capacity



Gives a spindle speed range of approximately 45-2000 RPM on standard, light-type drill presses. Makes possible the use of drills up to 1¼" without burning or stalling motor.

Designed to operate on all types of drill presses and other machines using a V-belt drive. Installed on motor shaft in 5 minutes. No bracket required. Drills up to 1¼" in steel. Taps up to ⅝" in steel. Reams and bores up to 3" in steel. Ideal also for spot-facing, counter-boring and other operations requiring slower speeds than are normally obtainable on standard machines.

Made in 3 Motor Shaft Sizes—½", ⅝", ¾".

Several Models Available

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Some Territories Open to Jobbers

THE PULL-GEAR CO.

21125 DEQUINDRE ST.

HAZEL PARK • MICHIGAN



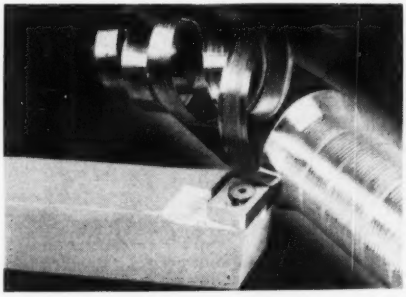
"Ventomatic" Air Control Valve

Ave., Cleveland 11, Ohio. Simple in design, the valve is arranged to open and close automatically as the machine switch is turned on and off, thus preventing the continual exhausting of warm air from the room when the machine is in operation. The operation of the valve is mechanically controlled by a solenoid and is in no way affected by the air stream. The valve is available in sizes to fit 3, 4, 5, 6, 7, and 8-inch ducts.

Turning Tool Takes Extra Heavy Cuts

Known as the "Hefti-Cut," a clamp-on turning tool for extra heavy duty turning, facing, shaping, and boring operations has been announced by The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. Designed to permit unusually heavy cuts to be taken without cracking the carbide tip, the tool features a "two-way" blank-positioning adjustment which includes an adjustable clamp and allows a maximum

Illustration showing how extra heavy cuts can be taken with DoAll "Hefti-Cut" Turning Tool



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$29.50 to $149.50

CARBOLOY-TIPPED SCRAPERS STAY SHARP LONGER!

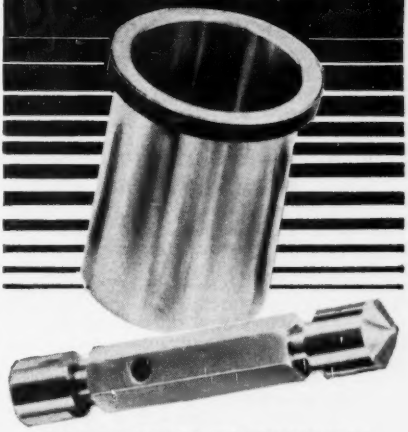
HERE'S WHY!

Forthman Scrapers are tipped with CARBOLOY CEMENTED CARBIDE—the hardest metal made by man. Holds keen cutting edge for hours instead of minutes of continuous use! Outwears as many as 10 ordinary steel scrapers! Provides finer finishes faster!

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ECONOMY PRECISION BUSHINGS AND GAGES WORK HAND IN HAND



- A.S.A. standard and special drill jig bushings.
- A.G.D. plug and ring gages, both new and chrome plate.
- Gages salvaged by hard chrome plating.

Write for bulletin and price list.

Economy TOOL & MACHINE CO.

1827 S. 68TH ST., MILWAUKEE 14, WIS.

portion of the blank to be used before being discarded.

Any manufacturer's standard blanks can be used with the Hefti-Cut, it is claimed. Also available specifically for use with the tool are blanks with preformed angles. The Hefti-Cut is made in three styles (offsets) for various turning, facing, and heavy shaping and boring operations. Each style is offered in several sizes to meet requirements of light or heavy duty jobs.

Type Holder and Interchangeable Steel Type Set

A type holder and interchangeable steel type set for hand or press stamping serial numbers, firm names, dates, and other markings on any material has been introduced by The Parker Stamp Works, Franklin Ave., Hartford, Conn. The set includes a variety of standard size letters carefully selected to provide maximum utility. An interchangeable threaded shank is also included with the set, thus allowing changes from hand stamps to press stamps in an instant.

The Parker Type Holder and Interchangeable Steel Type Set is available in a wide number of different sizes with varying combinations of numbers or numbers and letters. Each set is furnished complete with durable hardwood case to facilitate storage.



Parker Type Holder and Interchangeable Steel Type Set

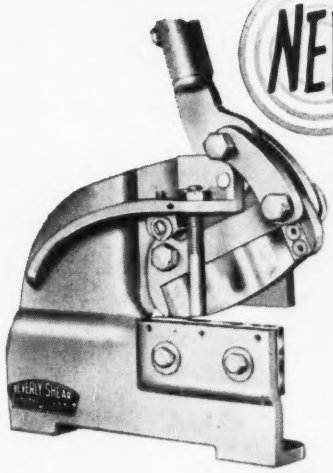
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Sizes for most 9" to 12" lathes. Rugged precision construction. 13¾" slide travels 6" maximum. Tool clearances over ram 3½" and 4". Today's best buy!

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SLITTING SHEAR

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EXCLUSIVE DESIGN . . . Cleaner Cuts
RUGGEDLY BUILT . . . Last a lifetime
CAPACITIES TO 3/16"

Get faster, easier slitting and trimming with a new design Beverly "SS" Series Slitting Shear. Rigid, strongly braced frame; compounded linkage and extra strength where needed. Many exclusive features. Write for FREE illustrated Bulletin.

See your Beverly Distributor today.
Ask for a demonstration—no obligation.

SS-3 3/16" slitting cap; 5/16" trimming; 1/4"x2" bar capacity.

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CONTINUOUS OIL GROOVING

WICACO CONTINUOUS OIL GROOVER cuts grooves of all descriptions, internal or external, continuous or intermittent.

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Manufacturers of
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Roller Bearing Twister Spindles—Spindle Oiling Machine
Precision Internal Grinder — Screw Machine Products.

NEW SHOP LITERATURE

High-Pressure Solenoid Valves. An eight-page two-color bulletin offered by Waterman Engineering Co., 725 Custer Ave., Evanston, Ill., fully describes and illustrates its line of high-pressure solenoid valves which are suitable for all hydraulic systems handling non-corrosive fluids. Dimensional drawings of the various types of valves are included.

Hydraulic Cylinders. An eight-page two-color illustrated bulletin (No. H-104G) issued by Miller Motor Co., 2024 N. Hawthorne Ave., Melrose Park, Ill., provides complete engineering, design, construction, mounting, and dimensional data on the company's line of hydraulic cylinders designed for 2,000-3,000 p.s.i. operation.

"Engraving Machine and Accessories," a bulletin (No. B-1) released by H. P. Preis Engraving Machine Co., 188 Industrial Branch, Hillside, N. J., illustrates and describes the company's line of engraving machines for use on steel, other metals, and plastic. Information on diamond cutters, cutters and collets, cutter grinders, and rotary work tables is also included in this bulletin.

Lubricants. The Alpha Corp., 174 Hamilton Ave., Greenwich, Conn., has released an eight-page two-color bulletin (No. 93) which describes its "Molykote" lubricants for machine tools, dies, extreme temperature lubrication, cold forming of metal, cold heading, instruments, and sundries.

Ball and Roller Bearings. A 20-page illustrated catalog (No. 28) issued by The Gwilliam Co., 360 Furman St., Brooklyn 2, N. Y., describes its line of ball thrust, roller thrust, step, journal roller, industrial roller, and special bearings. A range of standard sizes available are listed in tabulated form.



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THREAD MEASURING MADE EASY
WITH NEW 60° THREAD TRIANGLES



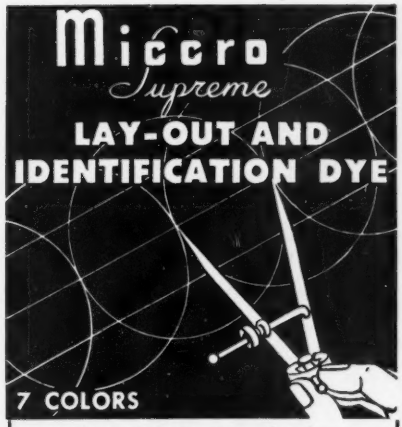
Quickly checks all 60° standard and special threads from 4 to 56 pitch...ANY O.D. No "fancy" calculations...just add a constant to O.D. That's all. Comes *complete with chart.*

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LAY-OUT AND IDENTIFICATION DYE



7 COLORS

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

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HACK SAW BLADES



THE CAPEWELL MANUFACTURING CO.
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Please send me your bulletin on Power Hack Saw Blades.

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5CA52R

"Contour Turning on Springfield Lathes" is the title of a six-page two-color bulletin (No. 184) issued by The Springfield Machine Tool Co., Springfield, Ohio, which describes and illustrates a hydraulic contouring attachment used to perform turning, boring, and facing operations on shafts, axles, rotors, and other parts with varying diameters, shoulders, tapers, radii, and flanges.

Groove Pins. A six-page two-color folder which describes and illustrates five types of groove pins and how they can be applied as fastening units to join two or more fixed or movable parts has been released by John Gillen Co., Inc., 2542 S. 50th Ave., Cicero 50, Ill. Positive anchorage features of the pins are also illustrated.

Abrasive Discs. A 60-page pocket-size book released by Gardner Machine Co., 428 E. Gardner St., Beloit, Wis., contains helpful information for users of abrasive discs on surface grinding operations. Contents of the book include data on abrasive fundamentals, disc selection, available disc types, standard markings, spindle speeds, coolant selection, dressing, safety, grinding various materials, and care of discs.

Industrial Dust Collectors. A 12-page two-color brochure issued by Torit Mfg. Co., 296 Walnut St., St. Paul 2, Minn., describes and illustrates its line of industrial dust collectors for grinders, polishing machines, woodworking machinery, and related applications. Complete specifications of the various types of collectors are included.

Open Back Inclinable Power Presses. An eight-page two-color bulletin (No. P-552) released by Sales Service Machine Tool Co., 2335 University Ave., St. Paul 4, Minn., provides full information on the company's line of Press-Rite Open Back Inclinable Power Presses. Illustrated and described are eight models with capacities of 5, 10, 15, 20, 30, 60, and 85 tons. Detailed specifications are given for each press.



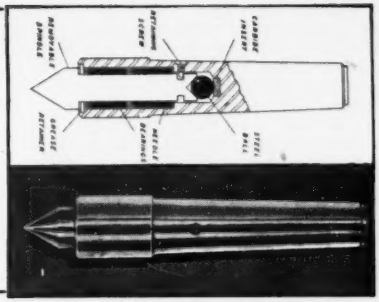
Less overhang — more capacity

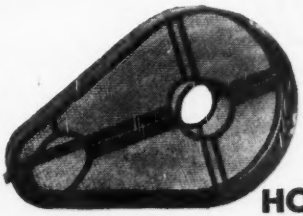
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No bulky heads on WEE Live Centers. 30 to 40% less overhang increases machine capacity, permits deep cuts, faster speeds. Same dimensions as solid centers. Rigidity and concentricity of dead center. Runout held to .00015. Used by hundreds of leading concerns. No. 2 M.T., $21.00. Request complete price list.

Write direct, if distributor cannot supply you.

HERBERT CROSS & SON, Bala-Cynwyd, Pa.





MACHINE GUARDS

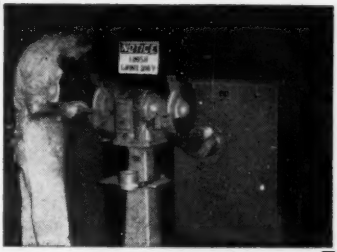
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Ask for catalog 605-2

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AGET-DETROIT CO.

207 Main St. Ann Arbor, Mich.

Tempering Units. A two-color illustrated bulletin (No. D-18) issued by Ipsen Industries, Inc., 721 S. Main St., Rockford, Ill., describes its D-300 and D-700 Controlled Atmosphere Tempering Units which are designed for bright or blue tempering operations up to 1,400 deg. F. A cross-sectional view and specifications are included.

Adjustable Drill Jig. Mathewson Machine Works, Inc., 2 Hancock St., Quincy 71, Mass., has released a two-color illustrated bulletin which describes an adjustable drill jig used for drilling holes of from 0.052 to 0.531 inch in diameter in cotter pins, set screws, cap screws, and so on.

"Our Latchstring Is Always Out," a 36-page pocket-size booklet released by Ingersoll-Rand, 11 Broadway, New York 4, N. Y., presents a brief history of the company and its plants. Rock drills, air and electric tools and hoists, air and gas compressors, gas and Diesel engines, centrifugal blowers, centrifugal and propeller pumps, vacuum and condensing equipment, and refrigeration units manufactured by the company are illustrated in actual use.

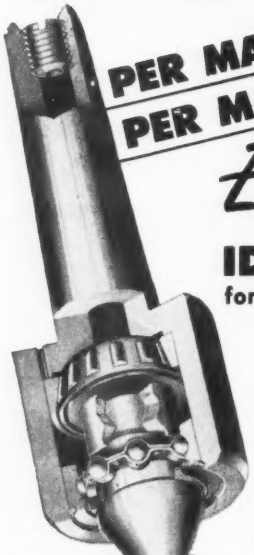
Ground and Unground Hobs. A four-page two-color illustrated bulletin released by Standard Tool Co., 3950 Chester Ave., Cleveland 14, Ohio, provides engineering data on single thread ground and unground hobs. A hob tolerance chart for standard single thread hobs is included.

Drill Presses. An eight-page two-color catalog issued by Boice-Crane Co., 937 Central Ave., Toledo 6, Ohio, describes and illustrates its "Helmet Head" and "Challenger" lines of drill presses, including high and slow speed bench and floor models in one, two, three, and four-spindle combinations. Information on accessories and attachments is included.

More Lathe Output

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PER MACHINE!

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Make deeper cuts at faster speeds . . . No gouging or burning . . . No spoilage or rework . . . Precision-built for micrometer accuracy. "Multi-Duty" Models available with male, female and pipe points. "Heavy-Duty" Models for BIG jobs. All standard sizes.

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Our ROWBOTTOM cam cutting facilities are at your disposal for your cam requirements.

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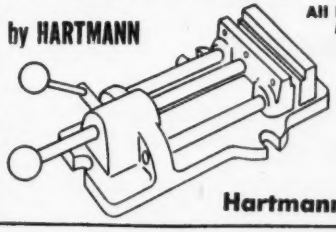
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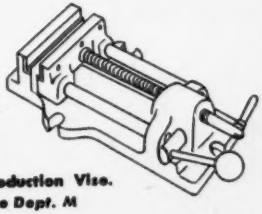
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All Purpose Tool Room And Machine Shop Vises.

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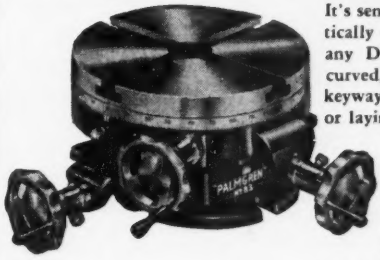
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The Only Table Having ROTARY FEED Combined with DUAL CROSS FEEDS



It's sensational—in price, construction, performance. Practically a universal milling machine. Designed for use on any Drill Press or Milling machine. Rout straight or curved, rabbet, drill, sand or mortise. Mill slots, grooves, keyways, squares, hexagons, curves, flats, dovetails, index or laying out work.

Precision made, it permits fine work to close tolerances. Rotary feed is calibrated in degrees; Cross Feed in thousandths. Cross slides and feeds are 2¼" each side of center—4¼" overall. Adjustable gibs on cross slides—40 to 1 worm and gear ratio in rotary feed. 4 Bolt slots—2 Lock screws. Order NOW!

No. 83—8" Table $54.50

No. 82—Without Rotary Feed $43.75

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CHICAGO TOOL AND ENGINEERING CO.

Mfrs. of* PALMGREN PRODUCTS *for over 34 years
8399 South Chicago Ave., CHICAGO 17, ILL.

Alloy Steels. Peter A. Frasse & Co., Inc., 17 Grand St., New York 13, N. Y., has released a file-card sized, cardboard chart which shows chemical analysis for each of 70 military, army, navy, aeronautical, and federal specifications of alloy steel. Also listed are specified forms (sheets, bar, tubing, and so on) and the nearest corresponding S.A.E., A.I.S.I., and A.M.S. type numbers.

Interlocking Wiring Devices. The Arrow-Hart & Hegeman Electric Co., 103 Hawthorne St., Hartford 6, Conn., has issued an eight-page two-color bulletin which discusses the operation and advantages of "Hart-Lock" interlocking wiring devices. Illustrations are provided which show typical applications throughout industrial plants, automotive repair shops, and other establishments employing portable electric tools.

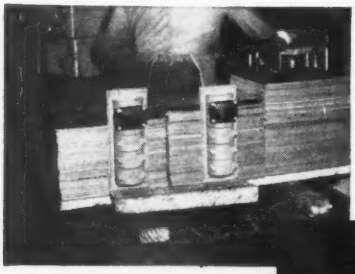
"The Science of Economical Shelf Storage" is the title of a 16-page two-color illustrated catalog (No. 110) released by The Frick-Gallagher Mfg. Co., Wellston, Ohio, which discusses the many benefits of using "Rotabin" rotary shelving to store parts, tools, and materials efficiently in tool or supply rooms. Information on various types of accessories that are available is included.

Pliers and Adjustable Wrenches. An eight-page folder issued by Utica Drop Forge & Tool Corp., Educational Dept., Utica 4, N. Y., provides a carefully compiled table of some 144 pliers and adjustable wrenches. A pictorial diagram shows the logical groupings of pliers by design characteristics.

Flexible Couplings. A four-page two-color illustrated bulletin (CDC-52) released by Cone-Drive Gears, Division of Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich., fully describes its standard bore flexible couplings for Cone-Drive worm shafts, gear shafts, and electric motor shafts. Information on capacities and ordering, as well as specifications, is included.

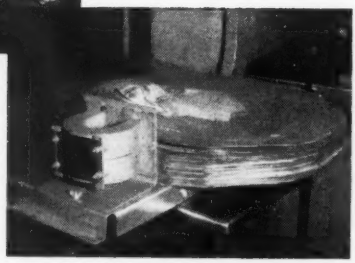
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Left—12" Sheet Floaters used on rectangular sheets.

Right—6" Sheet Floater used to separate blanks.



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separate stacked steel sheets or blanks in a manner that makes it easy for operators to grasp the top piece and feed it into a machine. No special tools, electricity or air required. Write for data sheet giving full details and prices.

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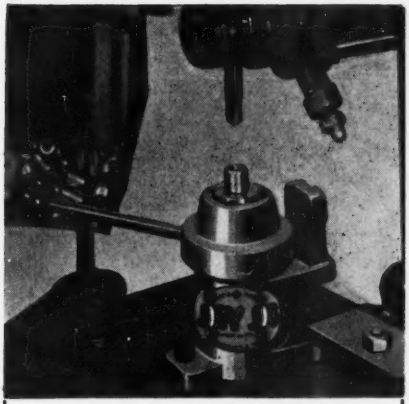
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This fast, accurate, low-cost collet-type work holder speeds secondary operation drilling, milling, tapping, etc., either horizontal or vertical. • Guide bushing support (not shown) for cross hole drilling. • Spring ejector (optional) speeds work. • Simple, dependable, proven in service. Send for our folder.

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Vimcolights can be installed in a jiffy. They adjust easily to any position *and stay put!* Oil proofing for wet operation available. Many applications . . . send for Bulletin 74 today.

VIMCO MFG. CO., Inc.

Since 1919

111 Brayton Street Buffalo 13, N. Y.

Structural Shapes. A four-page two-color illustrated bulletin released by Kling Bros. Engineering Works, 1328 N. Kostner Ave., Chicago 51, Ill., describes many uses for its rolled or formed angles, beams, channels, bars, and rails of steel, aluminum, or brass.

Coolant Pumps. The Ruthman Machinery Co., 1817 Reading Rd., Cincinnati 15, Ohio, has released a thumb-indexed catalog which describes its line of coolant pumps. Information on motors designed to meet special requirements is included.

Application of Diamond Abrasives. An eight-page two-color booklet released by Abrasive Division, Elgin National Watch Co., Elgin, Ill., contains basic information on the characteristics of diamond as an abrasive, as well as illustrations and explanations of primary applications of diamond abrasives. Catalog data on Elgin "Dymo" Diamond Abrasive and the "Dymo" finishing accessory line are included.

Granite Surface Plates. The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill., has released a two-color illustrated bulletin (No. 51-829) which discusses the features and advantages of granite surface plates for precision measuring and gaging operations. Data on numerous sizes and prices of plates with different accuracies up to 50 millionths are included.

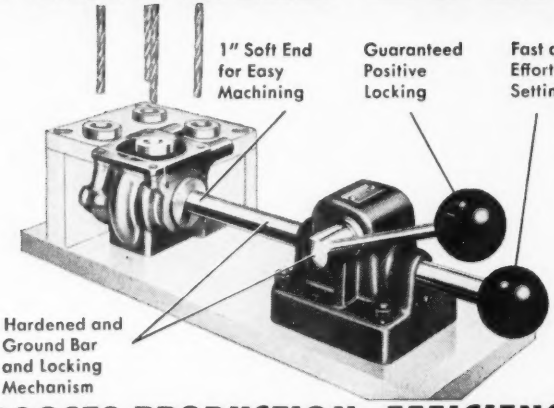
Hydraulic Rod Cutter. A bulletin issued by Manco Mfg. Co., Bradley, Ill., contains illustrated and descriptive information, including specifications, on the Manco Model 200-E Guillotine Hydraulic Cutter which provides a 20-ton thrust to cut ½-inch carbon steel rod in ¼ second with push-button control.

Materials Handling Equipment. Bay Products, Inc., 3015 N. 16th St., Philadelphia 32, Pa., has issued a 16-page illustrated catalog (No. DMU) which describes its line of materials handling products, shop boxes, and shop equipment.

ANNOUNCING!

HEINRICH SCREWLESS *Grip-Master*

FIXTURE LOCK



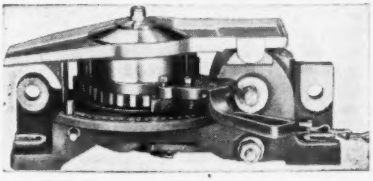
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Now—at the request of industry—we offer the new "Grip-Master" Screwless Fixture Lock, applicable for fixtures and jigs used in drilling, milling operations, etc. It incorporates the same high-quality locking mechanism proved by industrial use in the famous "Grip-Master" Screwless Drill Press Vise. Pays for itself quickly by increasing production, cutting tooling costs, etc. See your Dealer, or write for details.

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Chucking & Indexing Fixture



1. 1800 light cuts per hour.
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3. Collets changed instantly.
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Manufacturers of Diamond Wheels and Hones of highest quality.

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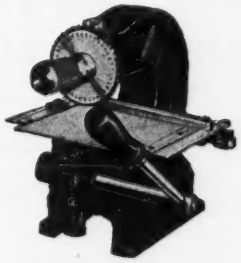
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CUTS THE COST OF STAMPING NUMBERS

New Model 40B
NUMBERING and LETTERING PRESS
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Designed for impressing Letters and Numbers in all kinds of flat metal parts. Stamps plates up to 5" w. x 6" l. Carriage table advances one space with each impression of the dial, like a typewriter, doing rapid work, even spacing and perfect alignment. Different size dials are interchangeable. Direct sight gauge facilitates stamping in the proper space.



New Model 40B

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NUMBERALL STAMP & TOOL CO.
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Standard Thread Gages. A 20-page bulletin (No. SG-52) listing prices of standard thread gages made by Detroit Tap & Tool Co., 415 Boulevard Bldg., Detroit 2, Mich., is now available from the company. Gages priced in the bulletin include thread plug gages, thread ring gages, and thread setting plug gages for machine screw and fractional thread sizes. Types and uses of thread setting plug gages are discussed. Tables listing "W" and "X" and "Y" tolerances for thread gages are also included. Pipe thread gages priced in the bulletin include thread plug and thread ring gages for American Standard taper pipe threads; plain plug, thread plug, plain ring, and thread ring gages for Aeronautical Standard pipe threads; and thread plug and thread ring gages for American Standard Dryseal pipe threads.

Bronze Bearings and Bars. A 76-page illustrated catalog (No. 52) issued by The Bunting Brass & Bronze Co., 715-755 Spencer St., Toledo 1, Ohio, describes the company's complete line of standard stock industrial bearings, precision bronze bars, electric motor bearings, and graphited oilless bearings. Data on design and engineering, grooved bearings, installation of bearings, machining of stock bearings, and tools for machining bronze bearings are included.

Pneumatic Comparator Gages. An eight-page two-color bulletin (No. 8005-S) issued by Moore Products Co., H & Lycoming Sts., Philadelphia 24, Pa., contains complete descriptive and illustrated information on the installation, operation, and maintenance of Moore Pneumatic Comparator Gages.

"Gear Errors Are Costly" is the title of a four-page two-color illustrated folder issued by Sier-Bath Gear & Pump Co., 9252 Hudson Blvd., North Bergen, N. J., which explains how Sier-Bath Precision Gears provide for unusually quiet and smooth operation; reduce down time; increase machine life; save space and weight; and cut assembly costs.

NEW BALANCED TOOL BITS do most cutting for you



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SUPER HIGH SPEED GROUND BITS

have balanced toughness, wear resistance, heat resistance — give you *the most cuts per bit and per dollar.*

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Please mail Comparison Chart S-1 and complete information on Sizes and Prices of du MOST Tool Bits.

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Cook Molds and Ladles will produce lead hammers that can "take it" and save you money. Simple to operate.

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Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from $\frac{3}{16}$" to $\frac{3}{4}$" U.S.S. Inexpensive — Last for years.

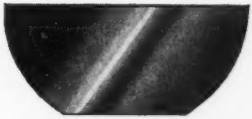


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We manufacture a complete line of Woodruff keys in all standard sizes. These sizes range from as small as ⅛" x 1/16" to keys as large as 3½" x ¾". All keys are carefully checked for burrs, slivers, etc. before being shipped to you. Only the finished tested keys are permitted to leave our plants.

We carry a complete stock of high quality, dependable keys. Send for our catalog for complete information on Woodruff keys, taper pins, machine keys, and machine racks.

STANDARD STEEL SPECIALTY COMPANY

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UNIVERSAL

STANDARD

COLLET CHUCKS

tools can't slip

tools run true



UNIVERSAL ENGINEERING COMPANY
FRANKENMUTH 9, MICHIGAN 162-B

"Cutting Gear Teeth on a Milling Machine," a 60-page illustrated booklet (No. M-1769) released by The Cincinnati Milling Machine Co., Cincinnati 9, Ohio, contains instructions on cutting worms and worm-wheels, and spur, helical, and bevel gear teeth on a milling machine. Index tables and tables of leads have not been included, inasmuch as they depend to some extent upon the age and style of the equipment.

Turbine Blade Airfoil Grinder. Pratt & Whitney, Division Niles—Bement—Pond Co., West Hartford 1, Conn., has published a four-page two-color circular (No. 551) which contains descriptions, illustrations, and specifications of the Pratt & Whitney Turbine Blade Airfoil Grinder which is designed to produce a profile section by copying and airfoil master cam.

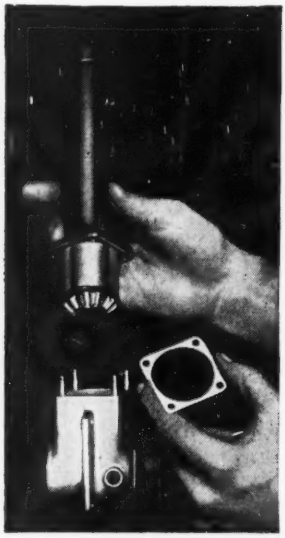
Cut-Off Saw Bands for use on horizontal and vertical type machines for production sawing of all kinds of material are described and illustrated in a four-page two-color folder published by The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. Specifications as to the available types of cut-off bands, lubricating information for cutting different kinds of material, information on the use of different tooth "sets" for different cutting jobs, and data on several specific cutting operations are included.

Safety Poster. A three-color illustrated poster stressing the importance of using guards with portable air grinders has been released by Cleco Division, Reed Roller Bit Co., 5125 Clinton Drive, Houston 20, Texas.

Duplicating Machines. A 32-page two-color catalog released by O'Neil-Irwin Mfg. Co., 576 Eighth Ave., Lake City, Minn., describes and illustrates how Di-Acro metalworking machines can perform a wide variety of forming, cutting, and punching operations on medium and lightweight materials.

2 Seconds

CAN SAVE YOU TWO HOURS!



Adjusting bevel gear mesh with a laminated shim is a matter of two seconds to remove a lamination!

The shim in this case is made of LAMINUM®, our exclusive material. It is a "solid" unit built up of 16 layers of .002 brass. It peels quickly and easily. Each shim removed adjusts the bevel gear position by two thousandths.

You save time by easier machining tolerances on the housing; ***you save time*** by eliminating pesky assembly machining; ***you save*** by not tying up a machine intermittently. IT'S EASIER!

LAMINATED SHIM COMPANY, INC.

SEND FOR LITERATURE

SHIM HEADQUARTERS SINCE 1913

Check Our Stampings Division For Your Stamped Parts Requirements

3310 UNION STREET • GLENBROOK, CONNECTICUT

Floor Patch. A four-page three-color folder issued by Flexrock Co., 3615 Filbert St., Philadelphia 4, Pa., describes an immediately-setting floor patch for repairing holes, ruts, breaks, and pitted areas in concrete floors.

Titanium and Titanium Alloys. Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio, has announced a 32-page two-color illustrated booklet which provides information on the melting, processing, tensile strength, fabrication, physical properties, metallography, corrosion-resistance, and theoretical weights of titanium and titanium alloys. Hardness conversion curves are also included.

Drive for Planers. An eight-page two-color illustrated bulletin (No. D-2306) released by Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, Ohio, fully discusses a variable speed drive for planers which is said to provide for extremely rapid and accurate reversals.



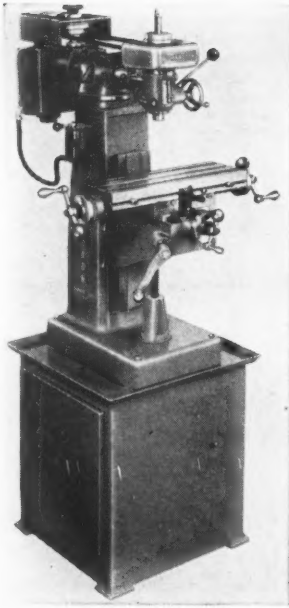
Courtesy Steel Cooperage Division of the Serrick Corp.

The versatility of De-Sta-Co Toggle Clamps is demonstrated by this unique welding fixture designed by the Steel Cooperage Division of the Serrick Corp. The fixture holds four rectangular and three round manifold flanges to an alignment plate during the inert arc welding operation. "V" type prongs replace one jaw on three of the 12 Model #468 portable clamps to give additional gripping area. The quick, positive holding pressure of the clamps cuts set-up time to a minimum and permits precise alignment of the manifold flanges. Rapid toggle action, sure holding pressure, ease of work removal and rugged durability make De-Sta-Co portable clamps the logical choice for this production application.

There's a De-Sta-Co Toggle Clamp engineered for your work holding problems in assembly, welding, bonding, machining or inspection of any material. Select from over 40 fixture and portable models. Positive holding pressures up to 4000 pounds. Write today for a copy of the De-Sta-Co catalog describing available stationary and portable toggle clamps.

DESTACO DETROIT STAMPING COMPANY

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THE JOHANSSON VERTICAL MILL OFFERS THE QUALITY You Want

Compact, rugged, precision-built, the Johansson Vertical Mill affords the quality in design and construction that you demand of today's machine tools.

Standard on every Johansson Mill are pre-loaded ball bearing spindle . . . handle and wheel feed for drilling and boring . . . micrometer depth stop . . . positive quill lock . . . ball bearing mounted lead screws, with precision ground threads . . . special, large dials . . . hand scraped ways throughout . . . and many other "extras."

Just check the specifications . . . you'll agree the Johansson is a mill of outstanding quality, and is priced surprisingly low!

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Condensed Specifications:

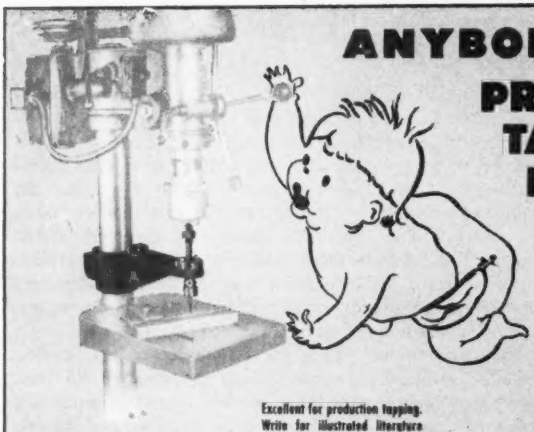
Table, 6"x18", 6"x24"
Long. Travel..12", 16"
Cross Travel .....5"
Vert. Travel .....12"
Quill Travel ..2-1/16"
Spindle Speeds (6)
180 to 3250 RPM
(with 1725 RPM motor)

JOHANSSON MACHINE TOOLS

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THE I. O. JOHANSSON CO.

7732 Austin Ave., Skokie, Ill.



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Excellent for production tapping. Write for illustrated literature and price lists.

You may not bring in your baby to run this tapping attachment, but any one with little or no skill can tap accurate threads consistently.

No matter who operates the "*Auto-tap*", you get only perfect tapping.

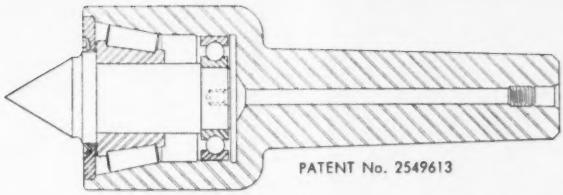
Automatic Methods INC.

"PRECISION PARTS FOR THE AIRCRAFT INDUSTRY" **42 Walnut St., Bldg. 188, Newark 2, N. J.**

PERFECTION

FREE CENTER

GUARANTEED FOR ONE YEAR
ECCENTRICITY TOLERANCE
LESS THAN .0001"



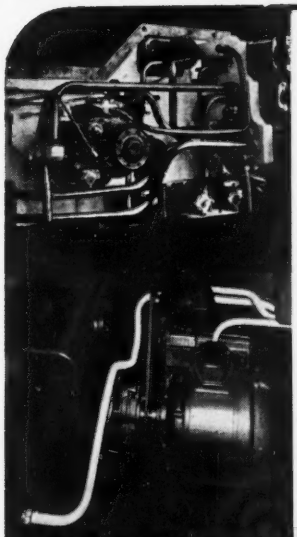
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● This year guarantee (or 3000 hours continuous operation) is made possible by simplicity of the design with only six parts including the shank plug.

Other features include absolute concentricity and perfect alignment for the two bearings, both conical and cylindrical bores of the body are ground at the same setting in the work head.

Perfection Free-Centers can be furnished to meet your requirements to any capacity up to the limit of roller bearings. Write today for descriptive folder.

MECHANICAL DEVELOPMENT CORP. 1627 BEAVER AVE. PITTSBURGH 33, PA.



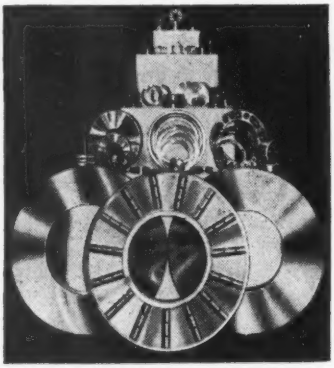
Typical smooth, efficient installations made with GREENLEE Hand Bender.

SMOOTH, accurate small-radius bends made quickly in pipe, tubing, conduit with Greenlee Hand Bender

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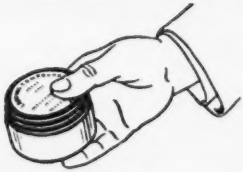
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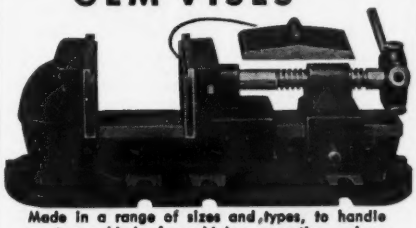
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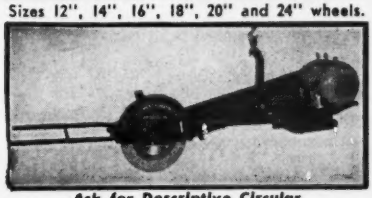


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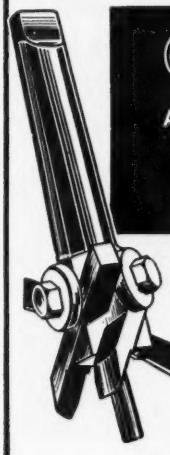
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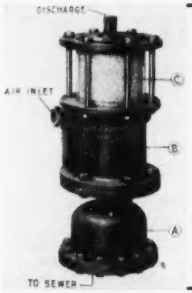


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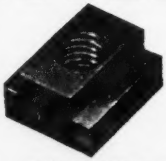
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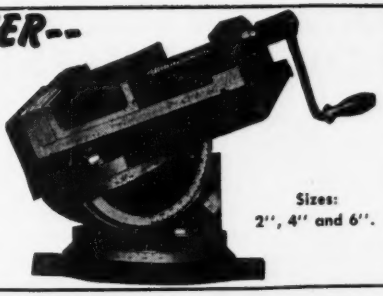
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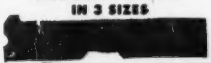
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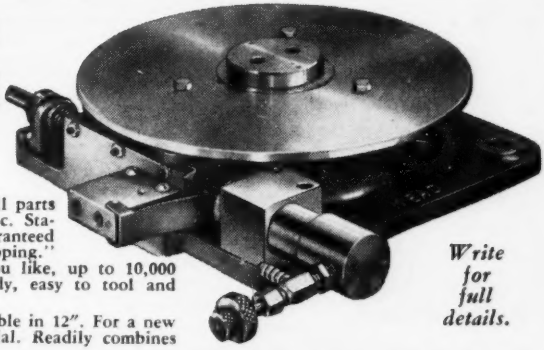
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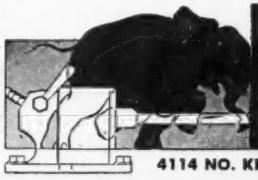
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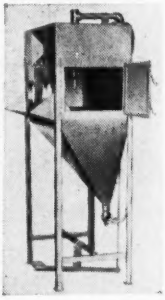
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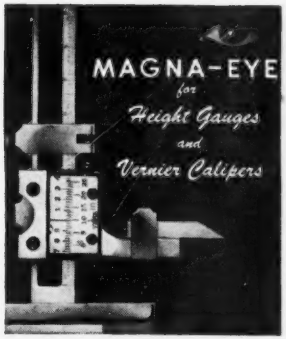
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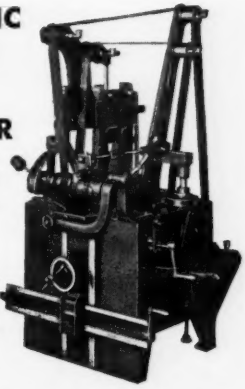


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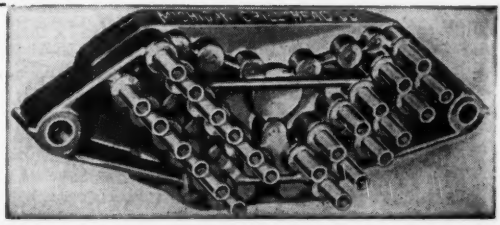
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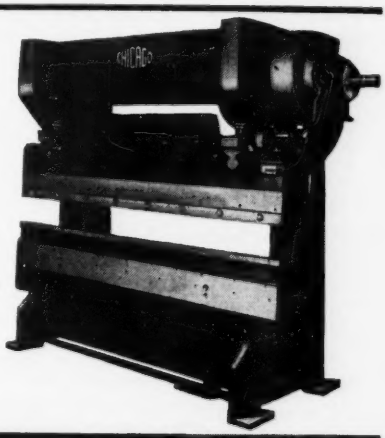
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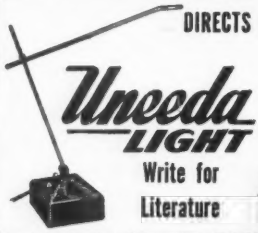
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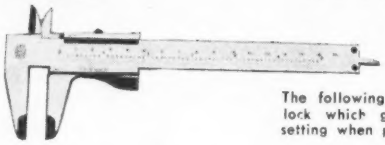
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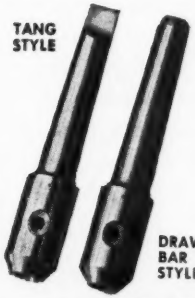
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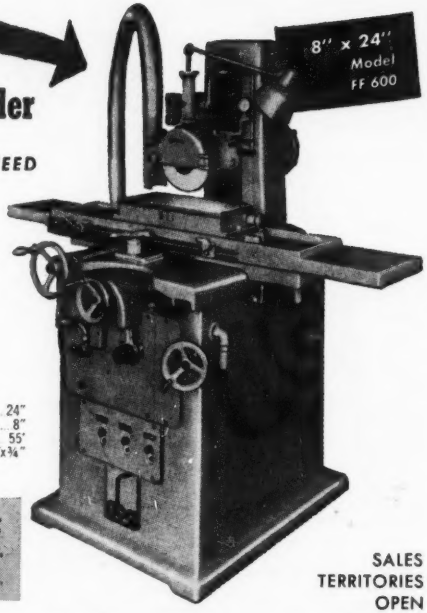
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Long. table speed, infinitely variable FPM	55'
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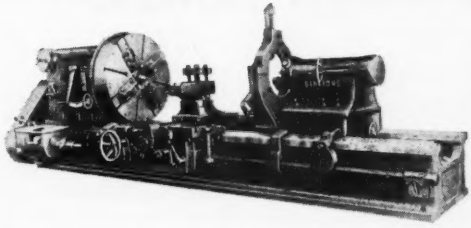
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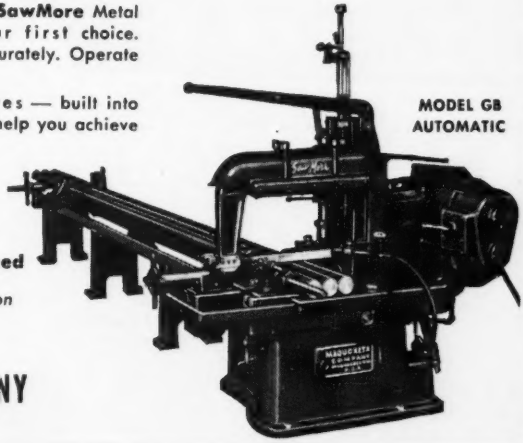
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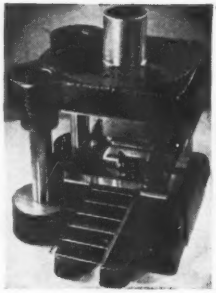
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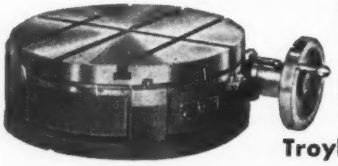


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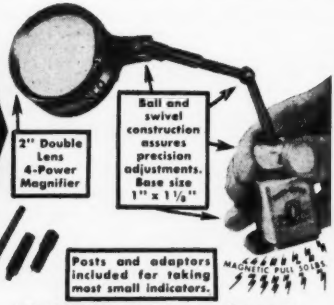


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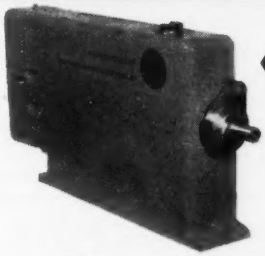
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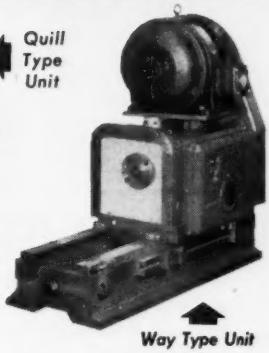
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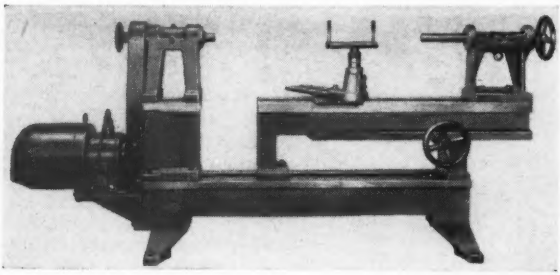
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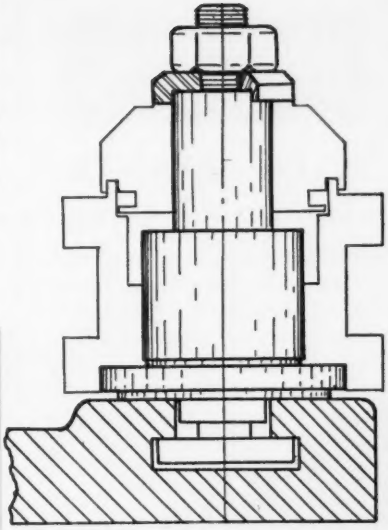
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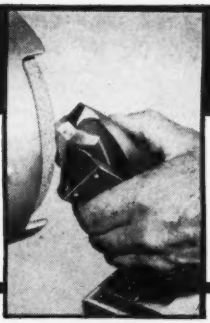
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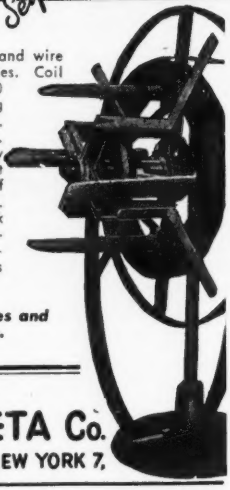
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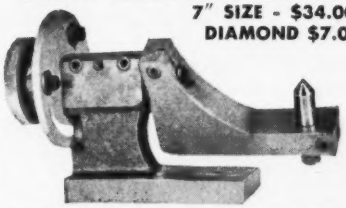
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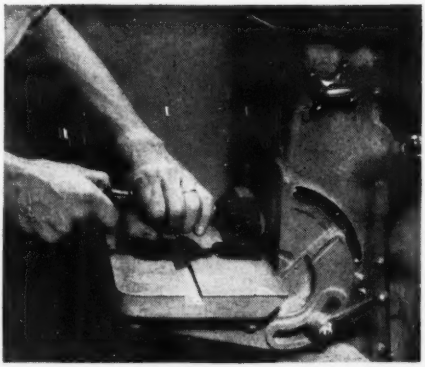
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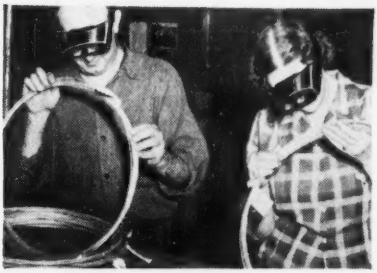
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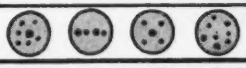
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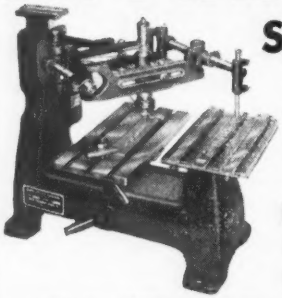
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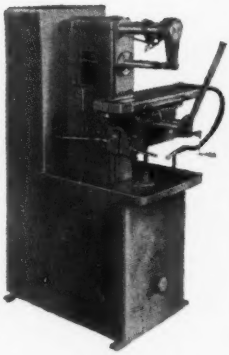
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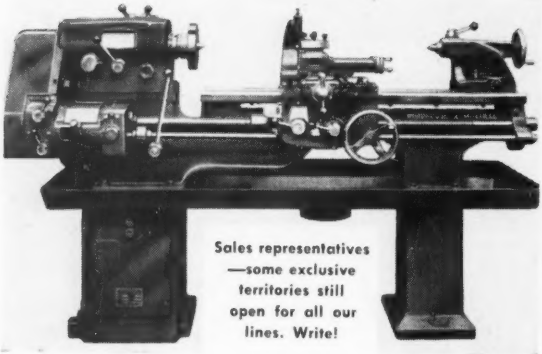


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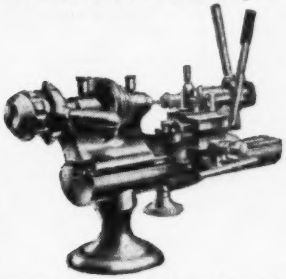
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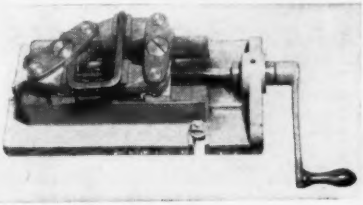
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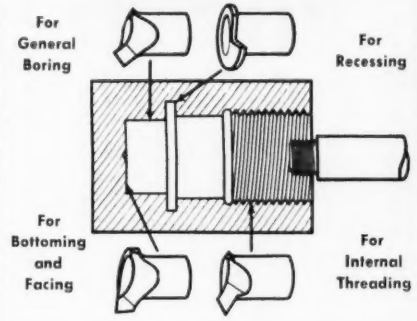
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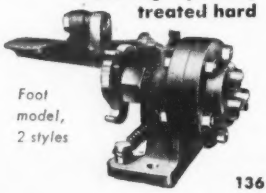
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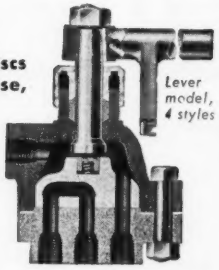
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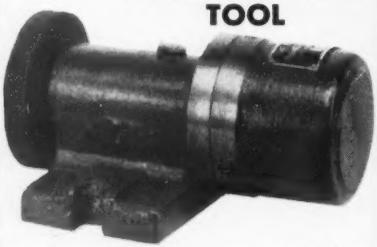
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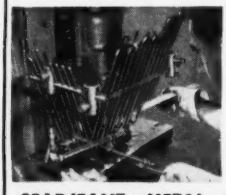
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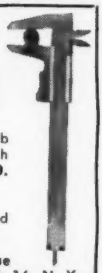


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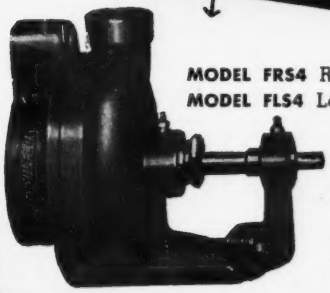


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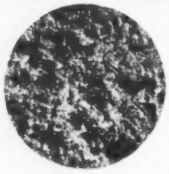
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Ram-Type Turret Lathe. Morey Machinery Co., Inc., 410 Broome St., New York 13, N. Y., has issued a six-page two-color bulletin (No. 530) fully describing and illustrating the Morey No. 2 Ram-Type Turret Lathe which features a wide variety of stepless speed variations without stopping the spindle. A dimensional diagram of the lathe and complete specifications are included.

Work Lamps. Sta-Put Lite & Equipment Corp., 1504 S. 44th St., Milwaukee 15, Wis.,. has released a four-page two-color circular which describes and illustrates its line of adjustable "Sta-Put" work lamps in incandescent or fluorescent types for all industrial uses. Complete specifications on the 12 available models are included.

Industrial Filters. An eight-page two-color folder released by The Industrial Filtration Co., 528 Industrial Ave., Lebanon, Ind., describes and illustrates the Delpark Industrial Disposable-Type Filter and the Delpark Industrial Endless-Belt Type Filter which are designed to meet a wide variety of industrial filtering needs. Information on the sizes, capacities, and performance characteristics of the filters, as well as their physical construction, specifications and ratings, and dimensions, is included in the folder. In addition, various industrial applications of the filters are illustrated.

"Everything for Safety" is the title of a 144-page catalog (No. 100) released by The Boyer-Campbell Co., 6540 St. Antoine St., Detroit 2, Mich. The catalog describes sight," "Skin-Cote" liquids and creams, for protection against skin infections, safety clothing, machine guards, and other safety equipment.

Air Cylinders. Miller Motor Co., 2024 N. Hawthorne Ave., Melrose Park, Ill., has released an eight-page two-color illustrated bulletin (No. A-105G) which presents complete engineering, design, construction, and mounting data, including mounting drawings and dimension tables covering 13 different mounting styles in 1½ through 14-inch bores, on its line of air cylinders.

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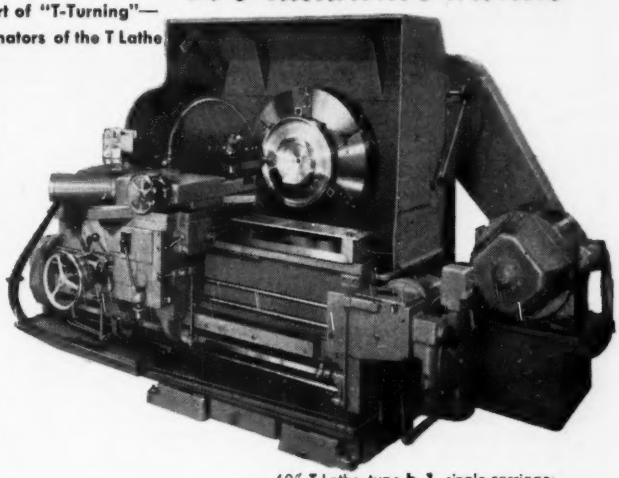
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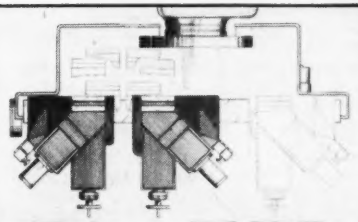
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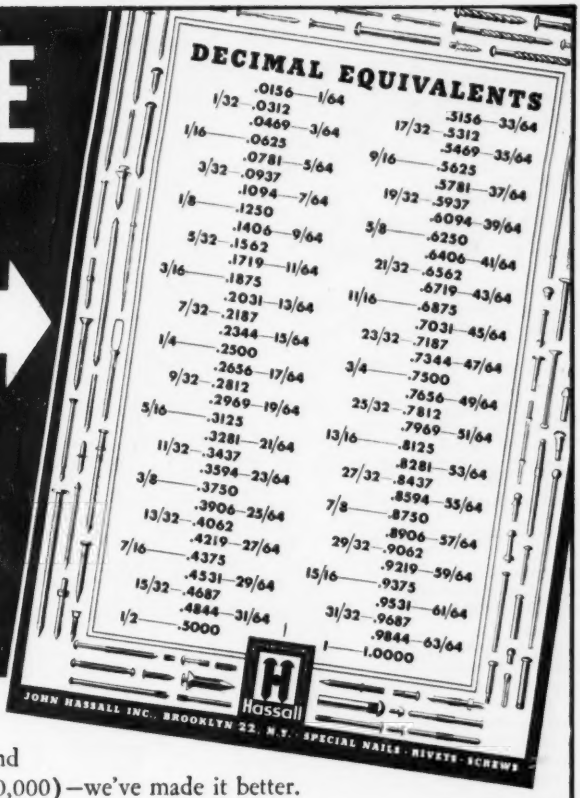
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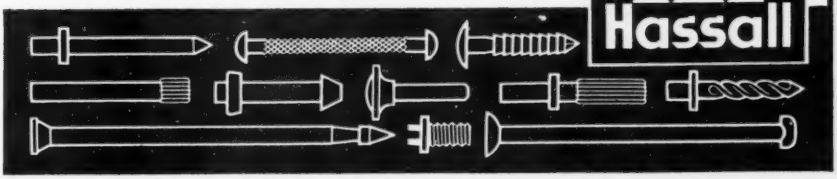
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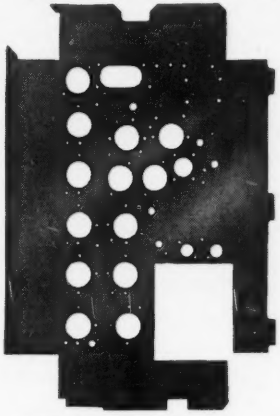
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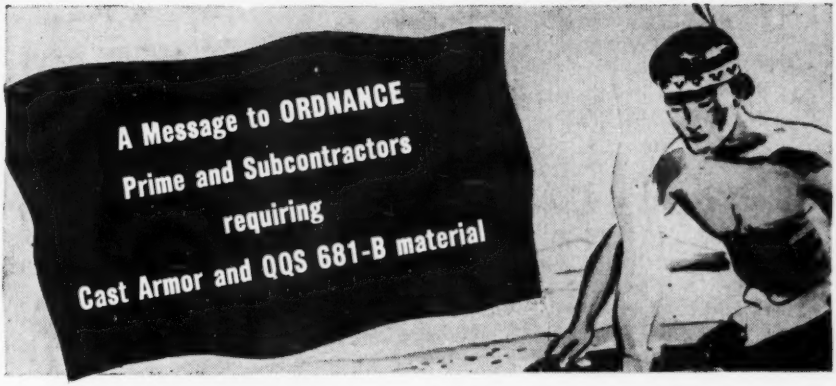
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Fred W Vogel



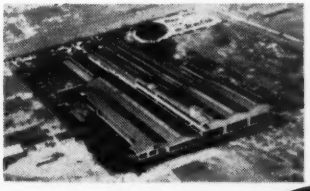
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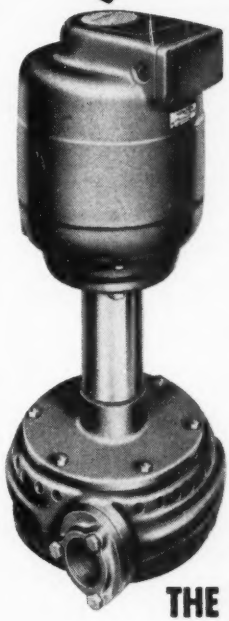
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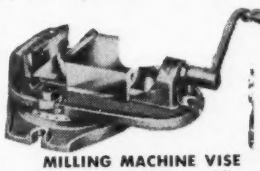
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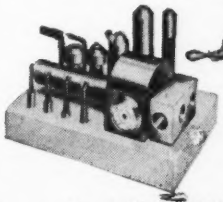
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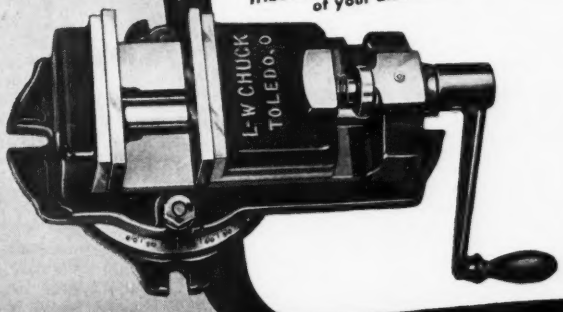
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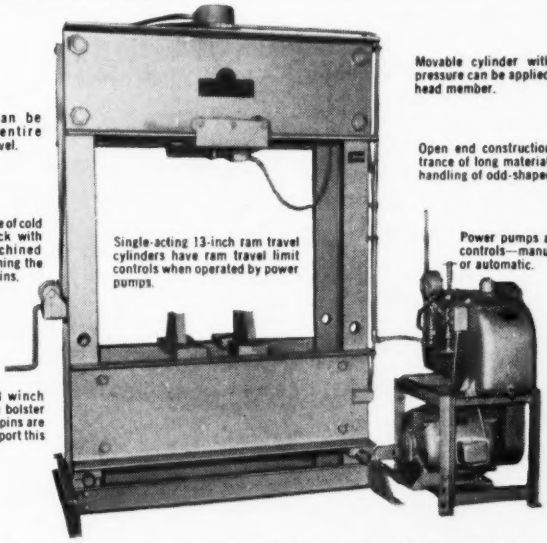
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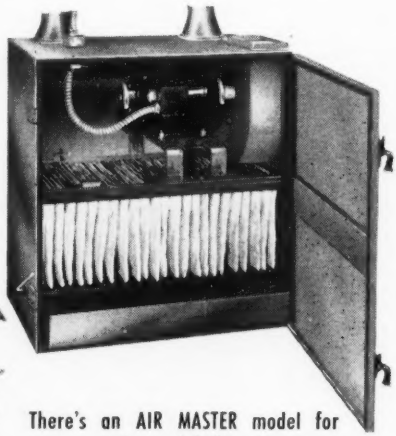
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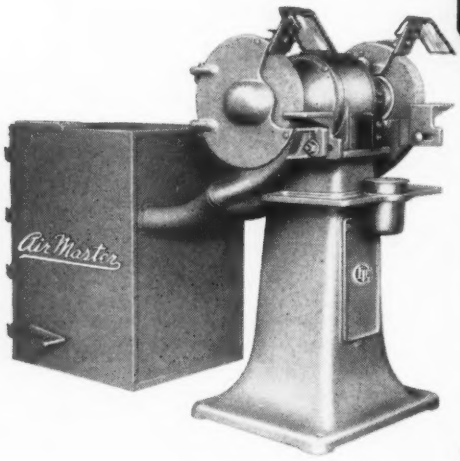
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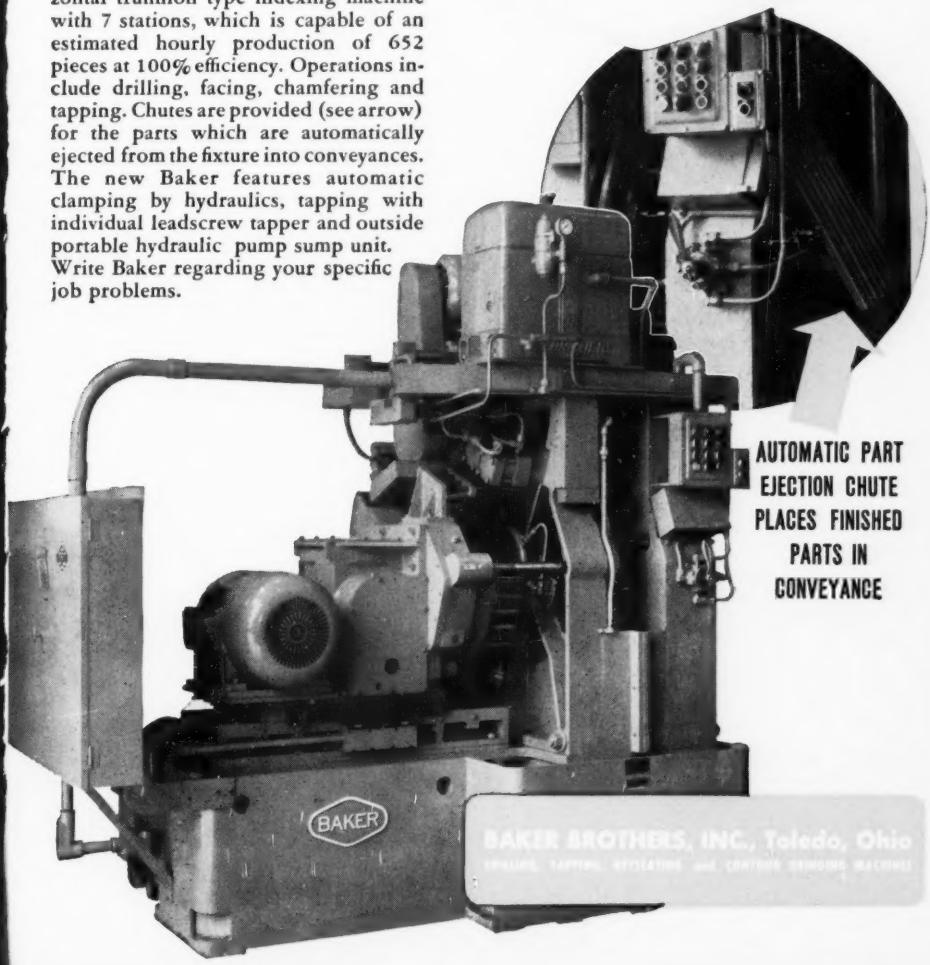
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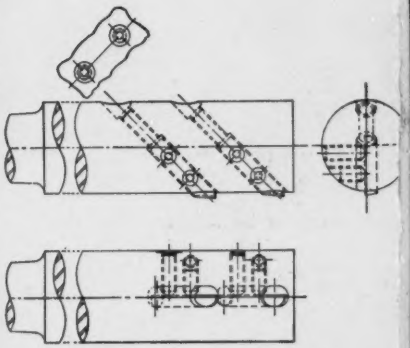
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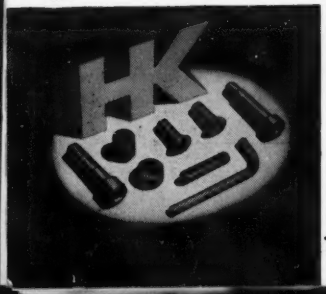


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